

Machine and Tool **BLUE BOOK**



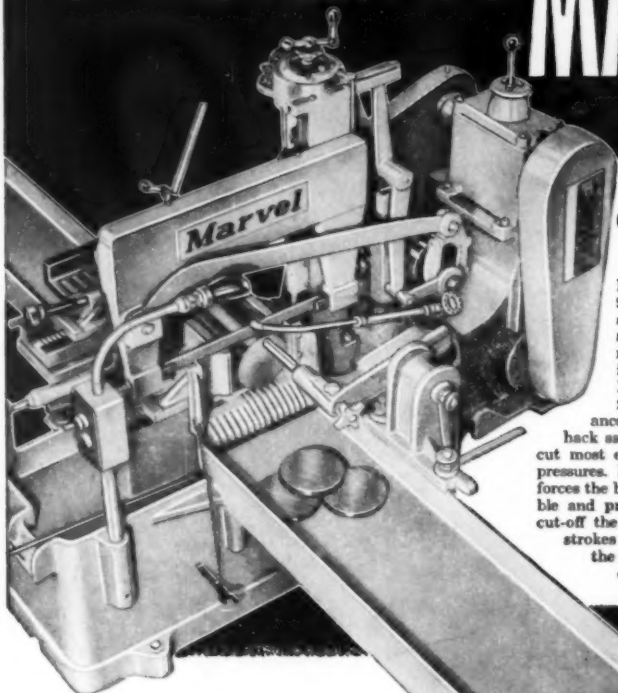
**Opel Shows Creative
Engineering in Production
of Automobiles 83**

**Also in this issue:
Individual vs. Group Incentives102**

A Hitchcock Publication

JULY • 1959

How Can Any Hack Saw Cut As Fast As a **MARVEL?**



GREATER EFFECTIVE FEED PRESSURE

MARVEL Series 6, 6A, 9 and 9A Hack Saws are capable of automatically applying *more than twice the feed pressure* required for most hack sawing jobs. This means that MARVEL Saws can utilize the full strength and heat resistance of the modern composite

hack saw blade which is designed to cut most efficiently under heavier feed pressures. MARVEL Dual Power Feed forces the blade to cut as deeply as possible and practical on every stroke—to cut-off the work in the fewest possible strokes by automatically adjusting the feed pressure in relation to the changing work resistance.

MORE CUTTING STROKES PER MINUTE

MARVEL Reciprocating Crank Lever Action, providing quick return of the saw frame on the non-cutting stroke produces $33\frac{1}{3}\%$ more cutting strokes per minute than ordinary saws without increasing the peak blade velocity on the cutting stroke. Result: faster cutting-off without damage to the blade.

With far greater feed pressures automatically available, plus more cutting strokes per minute, is it any wonder that MARVEL Series 6 and 9 Hack Saws will give you faster, accurate cutting-off every time?

Catalog C85 has complete details, facts and figures on both Marvel metal cutting Hack Saws and Band Saws. Write for it today.



ARMSTRONG-BLUM MFG. CO.
5700 BLOOMINGDALE AVE. • CHICAGO 39, ILLINOIS

PS-1201

MARVEL Metal Cutting
SAWS
Better Machines—Better Blades

BUL - X SP 5075

TYPICAL
APPLICATIONS

99
ANSWERS
TO
I. D. & O. D.
PROBLEMS

SUNNEN
External
Hone...

BUL - X MAN 5008 D

6th BOOKLET -
Gives details on
Sunnen Precision
Hole Gage and Size
Setting Fixture
combination. The set
that measures to $\frac{1}{4}$
tenths (.000025")
without gage blocks
or other setting
masters.

FIVE FREE BOOKLETS

SHOW BENEFITS AND APPLICATIONS OF

- FAST STOCK REMOVAL
- PRECISION SIZING OF I.D.'s or O.D.'s
- CONTROLLED SURFACE FINISH
- GUARANTEED STRAIGHTNESS AND ROUNDNESS
- LOW INITIAL COST—LOW COST PER PIECE
- NO CHUCKING, JIGS OR FIXTURES

GET ALL SIX BOOKLETS!
ASK FOR ASSEMBLY SP-11.
Contains valuable information
on Sunnen Honing Machines,
Mandrel Sets, Portable
Hones, External Hones, Pre-
cision Hole Gage and gives
production rates on 99
Typical Applications.

SUNNEN PRODUCTS
COMPANY

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7938

WHAT'S UP FRONT...

EASY-STARTING TEETH

**MAKES
THIS THE
EASIEST
HANDLING
HAND BLADE
YOU EVER USED!**

MILFORD's exclusive EASY-STARTING TEETH — fine milled teeth at the forward end of the blade — let you start the cut at any angle on the first stroke. If it must be sawed by hand — you'll do the job faster and easier with a MILFORD Blade! For all your hand hack sawing jobs, use the MILFORD Flexible REZISTOR teeth as sharp, fast-cutting and long-lasting as any all-hard blade. Back is tough and resilient . . . completely shatterproof in normal use.

**MILFORD
Flexible Rezistor
SHATTERPROOF
HIGH SPEED STEEL
HAND HACK
SAW BLADE**

BUY FROM YOUR MILFORD DISTRIBUTOR . . . a local businessman, who stocks the tools and equipment you need. You'll **SAVE TIME, CUT BUYING COSTS** and **REDUCE INVENTORIES.**

Ask for your free copy of the circular "It's Flexible."



THE HENRY G. THOMPSON & SON CO.
Saw Blade Specialists for Over 80 Years
NEW HAVEN 5, CONNECTICUT

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MACHINE and TOOL BLUE BOOK

What do you want in an inclinable?

AIR FRICTION CLUTCH? MECHANICAL CLUTCH?
FLYWHEEL OR GEARED PRESS?
SINGLE OR DOUBLE CRANK? AUTOMATIC FEEDS?
10 TON...200 TON?

Don't settle for "second-best" when the best may cost you less! Chances are whatever your needs in an inclinable, it's a Bliss standard—simply because Bliss makes more types and sizes of inclinable presses than any other builder. In fact, someone else's "special" may be a Bliss standard. Check it out for yourself before you buy—write for our most recent inclinable catalogs and data sheets. You'll see that size for size, no matter what you want in an inclinable, you get more press from Bliss... large crankpins, long strokes, greater openings, bigger beds and many other extra values. A press that's backed by a century of press engineering... by competent counsel... by a **dependable** parts and service program. In short, you'd be wise to check Bliss—first!

E. W. BLISS COMPANY
Canton, Ohio

BLISS
SINCE 1857

*Bliss is more than a name...
it's a guarantee!*

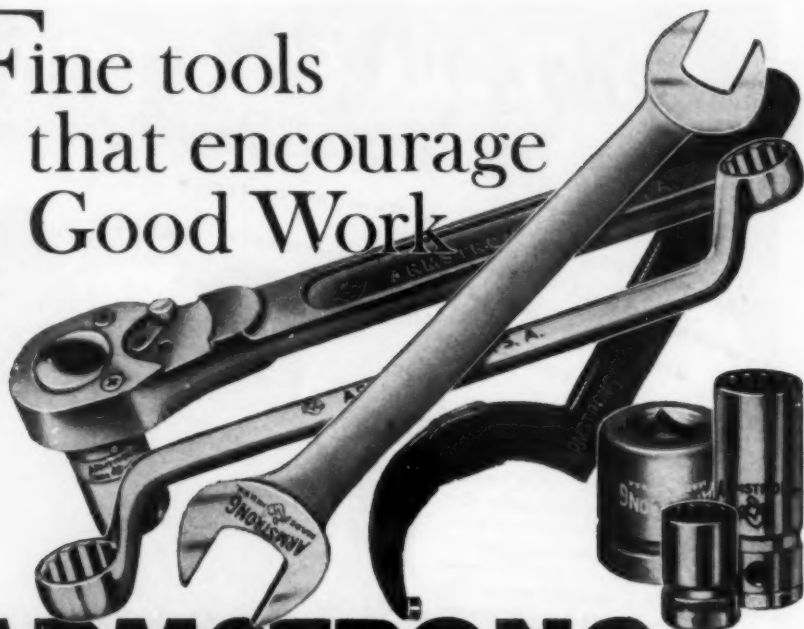
PRESSES • ROLLING MILLS • ROLLS
DIE SETS • CAN MACHINERY • CONTRACT MANUFACTURING

JULY, 1959

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Fine tools
that encourage
Good Work



ARMSTRONG WRENCHES

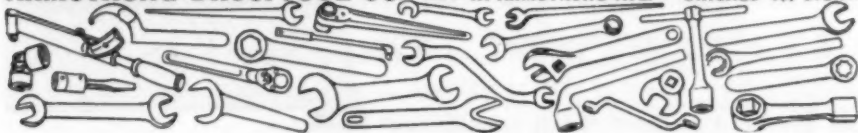
*If you don't know your local
ARMSTRONG Distributor,
we will send you the names
of those in your area.*



An ARMSTRONG Wrench feels right—is balanced. It goes over nuts or screw heads easily, grips firmly without sloppiness, won't round corners—because openings are carefully machined to correct sizes. It's safe, strong beyond need without clumsy bulk—because of superior design and selected steels, heat treated to proper degree of hardness and tensile strength. It's quality finished, ARMALLOY (alloy steel) Wrenches in chrome plate with heads buffed; HI-TEN

(carbon steel) Wrenches in baked-on gray enamel with heads ground bright... all plainly marked for size. All are uniformly excellent tools manufactured under strict quality control, by modern methods, with modern equipment in a modern tool plant... 1537 different industrial sizes and types—single wrenches, or sets in metal cases, boxes or rolls... each a quality tool. Armstrong Wrenches are "Fine tools that encourage good work."

ARMSTRONG BROS. TOOL CO. 5208 W. ARMSTRONG AVE. • CHICAGO 46, U.S.A.



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MACHINE and TOOL BLUE BOOK

Reader's Guide



JULY, 1959

VOL. 54—No. 7

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Hitchcock District Managers are listed on Page 64.

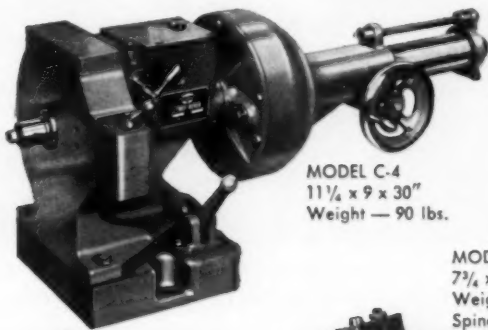
\$5.00 per year in U.S.A. \$6.00 per year elsewhere



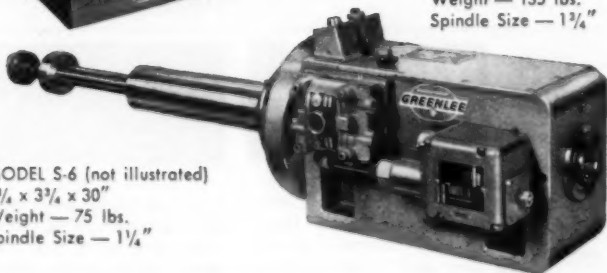
GREENLEE HYDRO-BORERS

Low cost precision boring

Patented oil displacement feed principle assures high quality finish. Compact design. Ideal for mounting in any position on work-holding fixtures, assembly jigs, etc. Simplifies production setups. Three models to meet all your requirements. Write today for further information.



MODEL C-4
11 1/4 x 9 x 30"
Weight — 90 lbs.



MODEL S-7
7 3/4 x 5 1/2 x 34 1/2"
Weight — 135 lbs.
Spindle Size — 1 3/4"

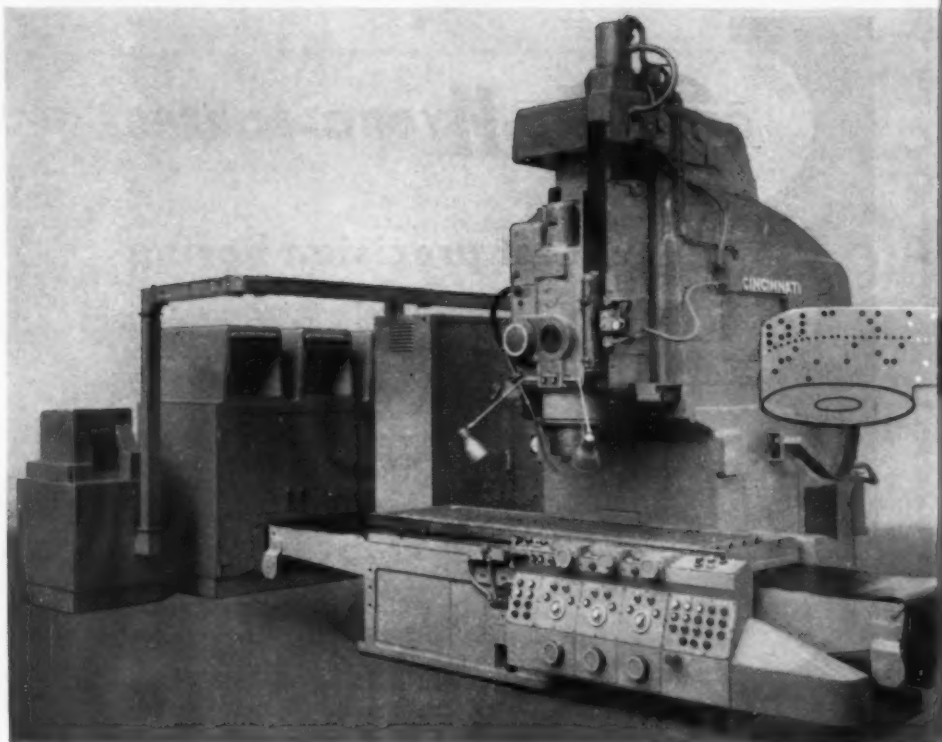
MODEL S-6 (not illustrated)
6 3/4 x 3 3/4 x 30"
Weight — 75 lbs.
Spindle Size — 1 1/4"



GREENLEE BROS. & CO.

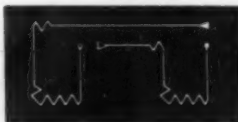
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Rockford, Illinois

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CINCINNATI 30" Vertical Hydro-Tel Milling Machine, 60" table traverse, equipped with CNC. Two cabinets at far left house numerical control equipment.

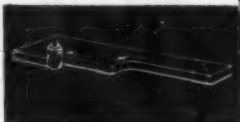
**PRINCIPAL
AREAS OF
APPLICATION
FOR CNC**



SEQUENCE CONTROL
CNC assures reliable automatic selection of feeds, speeds, spindles, coolant flow and other auxiliary machine functions.



POSITIONING
Tool-work positioning is fast, accurate. CNC eliminates expensive jigs, fixtures; reduces setup time.



STRAIGHT LINE CUTS
Multiple straight line cuts to exact length, and with abrupt changes in direction, can be programmed, set up and run in a fraction of the time required using conventional methods.

BUILDERS OF FINE MACHINE TOOLS: MILLING • GRINDING • BROACHING • DIE SINKING • CUTTER AND TOOL GRINDING
THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

CINCINNATI NUMERICAL CONTROL

gives you positive **COST CONTROL**
at the machine



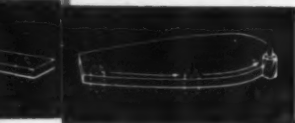
No more "cut and try" for machining operations. No change in setup for rough and finish cuts, new and re-ground cutters, right- and left-hand parts. No operator fatigue near the end of the shift. These are some of the ways in which Cincinnati Numerically Controlled (CNC) Machine Tools give you positive cost control.

Other CNC advantages: **Single Responsibility** . . . coordinated, coop-

erative effort by Cincinnati specialists in numerical control and in every activity required to deliver completely integrated machines. **Simple Programming** . . . CNC requires fewer input data points. **Precision Machining** . . . CNC is an absolute digital-analog system, assuring precise accuracy. **Simple to Use, Versatile.**

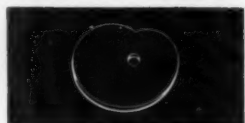
Cincinnati Numerical Control is the newest, most positive way to reduce lead time and many non-productive elements of excessive machining costs. Want specific job application data? Just present your production problems to us. For preliminary information, write for publication M-2066.

The Cincinnati Milling Machine Co.
Cincinnati 9, Ohio



CONTOURING

CNC greatly reduces lead time in reproducing complex, contoured parts; eliminates need for expensive templates, masters.



CAM MILLING

Fast, extremely accurate machining of master cams is assured on CNC controlled machines. CNC system of parabolic interpolation greatly simplifies programming of contour.

GRINDING • PRODUCTION LINES • METAL FORMING. HARDENING MACHINES

CINCINNATI

1



Unlocked position •
In this position tools
are inserted or re-
moved.

2



Locked position •
Handle is moved up-
ward as shown to lock
tools securely. Desired
locking pressure ob-
tained by nose adjust-
ment.

3



Working position •
Tool now securely held
in position—handle
removed.

TREE RAPID-LOK COLLET ADAPTER



EXCLUSIVE TREE FEATURE

The Tree Rapid-Lok is a collet adapter designed to hold end mills, boring bars, and other tooling *accurately, securely and with great rapidity* on both horizontal and vertical mills, jig borers, boring bars and other machines.

It is an adaptation of an exclusive feature which has been proved in use on Tree milling machines over a period of years.



For Full Information Write
TREE TOOL & DIE WORKS
RACINE, WISCONSIN

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MACHINE and TOOL BLUE BOOK

Expert repairs for anti-friction spindles of any make

Even the best spindles must eventually be repaired or rebuilt to restore high efficiency. When your anti-friction spindles need attention, remember Whitnon's special facilities for repairing and rebuilding tired, worn and damaged spindles of any make. Air-conditioned, dust-free Whitnon assembly rooms, Whitnon's experienced engineering personnel, Whitnon's specialized tools and instruments and sensitive dynamic balancing equipment, and Whitnon's complete stocks of bearings and parts — all these factors help assure that repairs on your spindles will be completed quickly and economically, with minimum down time and minimum cost. The same careful attention is given to spindles of other manufacture as to those carrying the Whitnon label, and the same complete repair facilities are available at Whitnon in Farmington and Whitnon in Detroit. Send your ailing spindles to either plant.

FOR REPAIRS

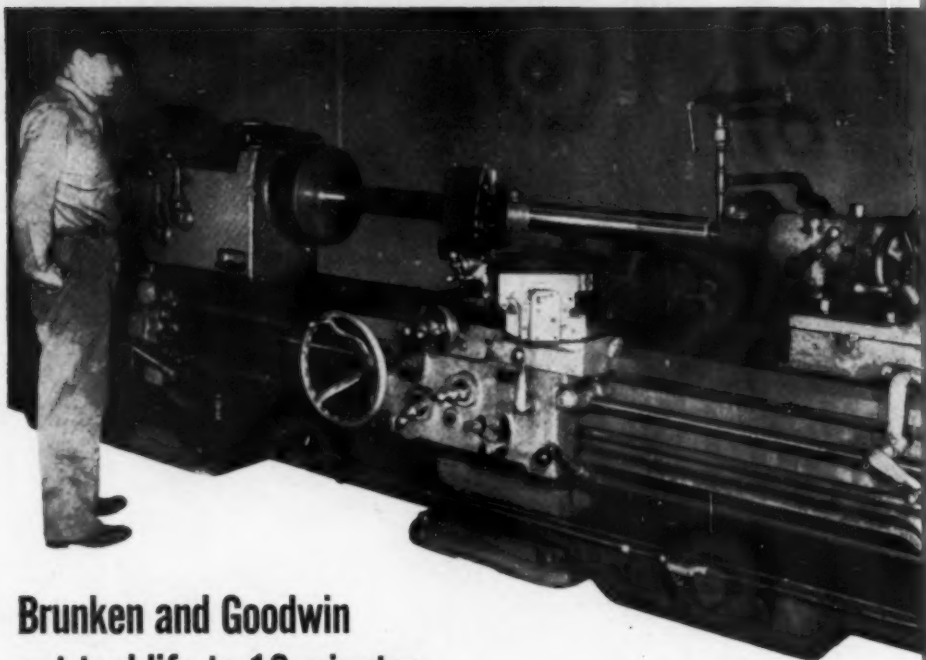
The Whitnon Spindle Company
20466 Wyoming Avenue
Detroit 21, Michigan

FOR REPAIRS

The Whitnon Manufacturing Co.
Route 6 and New Britain Ave.
Farmington, Connecticut

Whitnon

DON'T WASTE \$\$\$ IN YOUR



Brunken and Goodwin cut tool life to 19 minutes ... and doubled this machine's output

Here is one example of improved profits made possible by sacrificing tool life to gain *top machine efficiency* and lower cost-per-piece.

At Brunken and Goodwin Tool and Engineering Company, Maywood, Illinois, a closely recorded test showed that the same operator, using identical equipment and tooling could produce over two times as much with a \$2.63 reduction in cost-per-piece.

In the test set-up a 20hp Monarch Lathe was used to turn a piece of S620 steel, 280 Brinell hardness, to 5" outside diameter. For the 1/4"

depth of cut, Kennametal Grade K7H turnover type (throw-away) inserts with 6 edges were used throughout.

As shown in the table at right, this company reduced tool life from 120 minutes to 19 minutes. Tool insert costs thus increased from \$1.18 per day to \$7.45. But this expense means relatively nothing because production soared from 13 to 30 pieces per day—reducing cost-per-piece from \$5.01 to \$2.38—a 48% decrease.

Your Kennametal Carbide Engineer will gladly show you results

from other actual tests. Ask him for more information on how you can trade pennies in tool costs for dollars gained from top machine output . . . or write KENNAMETAL Inc., Latrobe, Pennsylvania.

	Before	Now
Tool life per edge	120 min.	19 min.
Machine cost/8-hr. day	\$64.00	\$64.00
Tool cost/8-hr. day	\$ 1.18	\$ 7.45
Cost per 8-hr. day	\$65.18	\$71.45
Pieces per 8-hr. day	13	30
COST PER PIECE	\$ 5.01	\$ 2.38

MACHINE OUTPUT TO SAVE \$\$\$ IN LONGER TOOL LIFE!

There are hundreds of machine shops in the Nation today that could **DOUBLE THEIR PRODUCTION OVERNIGHT**, reducing costs and helping to relieve the squeeze on profits, by merely substituting a **NEW IDEA** in place of an old, traditional method they are now using.

All they have to do is to start operating their machines to get maximum **OUTPUT** . . . instead of operating them to get maximum **TOOL LIFE**. They are saving pennies through longer tool life . . . but they are wasting dollars in unused capacity of expensive machines, the unused talents of skilled operators and possibly in overtime costs to meet schedules.

This method of reducing costs by increased machine output is **NOT** an experiment. It doesn't call for you to be a guinea pig to try it. It has been **PROVEN-IN-USE** by dozens of progressive plants, and the results have been astounding.

Some of the dollars-and-cents results are recorded here. They can be duplicated in any plant that has good machines . . . and that is ready to challenge old ideas about tool life.

Just put yourself in the place of some of these successful users. Take a mental trial-balance, and estimate the savings you might make. Ask yourself this all-important question . . .

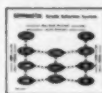
Which pays off best . . . long tool life . . . or top machine output?

Typical Examples - Same Machines . . . Same Tools . . . Same Workplaces								
	Job No. 1		Job No. 2		Job No. 3		Job No. 4	
	240-Minute Tool Life Setup	25-Minute Tool Life Setup	75-Minute Tool Life Setup	25-Minute Tool Life Setup	120-Minute Tool Life Setup	80-Minute Tool Life Setup	120-Minute Tool Life Setup	22-Minute Tool Life Setup
Machine Cost per Hour	\$ 8.00	\$ 8.00	\$10.00	\$10.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00
Tool Cost per Hour	\$.04	\$.40	\$.36	\$.76	\$.14	\$.215	\$.14	\$.77
Cost per 8-Hour Shift	\$64.32	\$67.20	\$82.88	\$86.08	\$73.12	\$73.72	\$73.12	\$78.16
Pieces per Shift	51	181	8	17	94 hrs./pc.	41 hrs./pc.	8	16
Cost per Piece	\$ 1.26	\$.37	\$10.36	\$ 5.06	\$89.16	\$37.81	\$ 9.14	\$ 4.88
Cost Reduction	70%		51%		56%		47%	

TO MULTIPLY YOUR MACHINE OUTPUT...YOU NEED THREE THINGS:



1. The "Three Man Tooling Team" that utilizes the specialized knowledge of your Tool Engineer, your Machine Operator, and the Kennametal Carbide Engineer . . . to determine the right tooling for each job.



2. The complete range of Kennametal grades that provides not only the exact properties needed, but assures the uniformity of quality that permits accurate prediction of tool life.

3. Kendex® (patented) Tooling that provides instant insert change



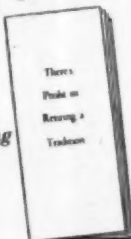
without having to re-position the tool. This is the key to this new method . . . frequent tool change without excessive down-time.

®Trademark

07230

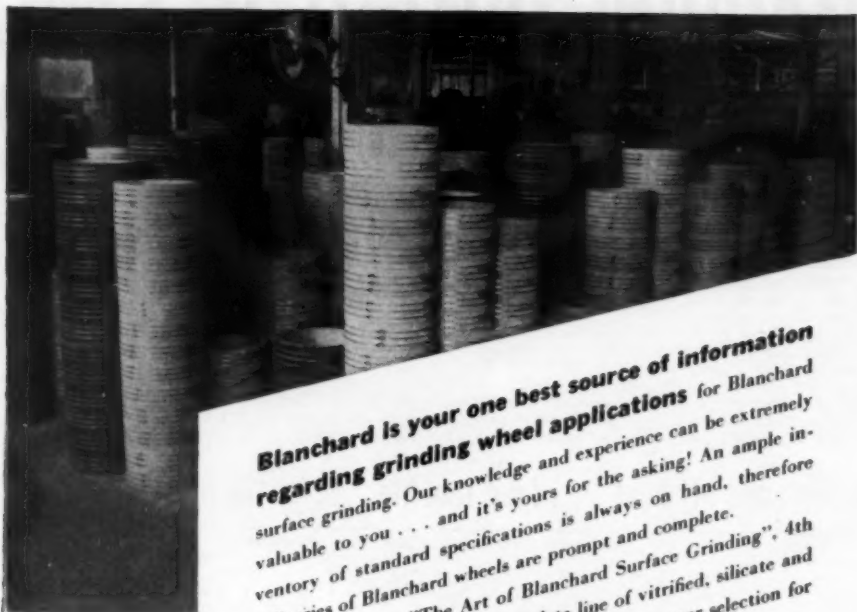
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"There's Profit in Retiring
a Tradition."



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KENNAMETAL
...Partners in Progress

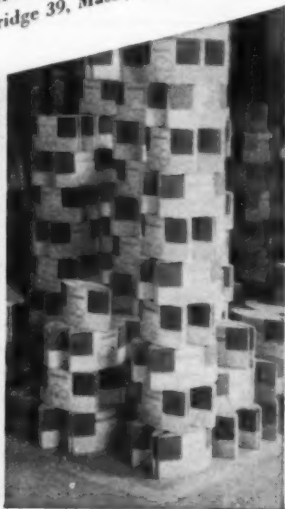
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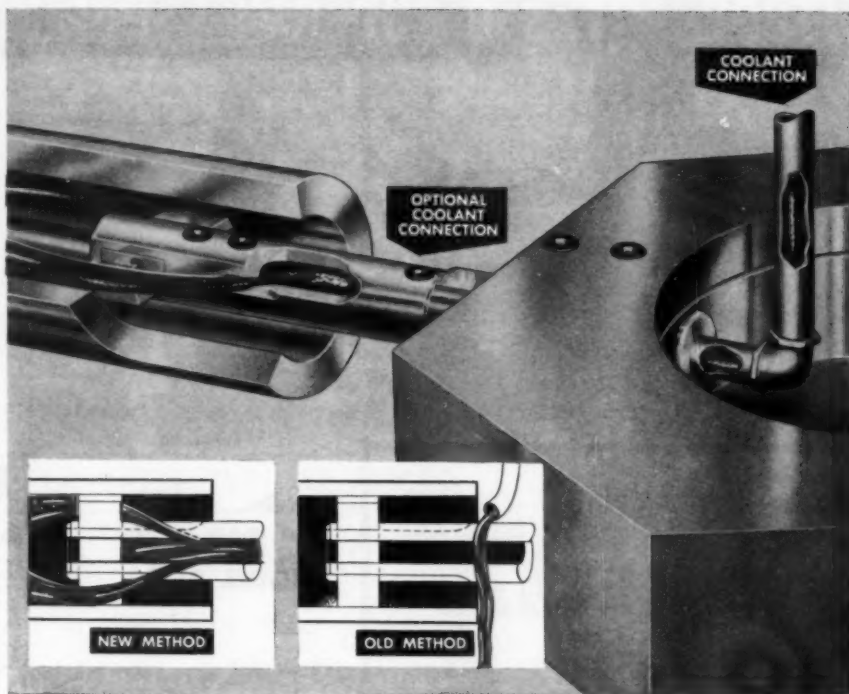


Blanchard is your one best source of information regarding grinding wheel applications for Blanchard surface grinding. Our knowledge and experience can be extremely valuable to you . . . and it's yours for the asking! An ample inventory of standard specifications is always on hand, therefore deliveries of Blanchard wheels are prompt and complete.

Send today for "The Art of Blanchard Surface Grinding", 4th edition, which describes the complete line of vitrified, silicate and resinoid bonded wheels and segments and the proper selection for Blanchard vertical spindle surface grinders.

THE BLANCHARD MACHINE COMPANY
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A ***HOT TIP*** for a COOL HEAD

VEE BEE's *new* DOUBLE DUTY boring bars with coolant veins

- Eliminates chip-choke
- Eliminates heat build-up

Available in all Vee Bee standard sizes.

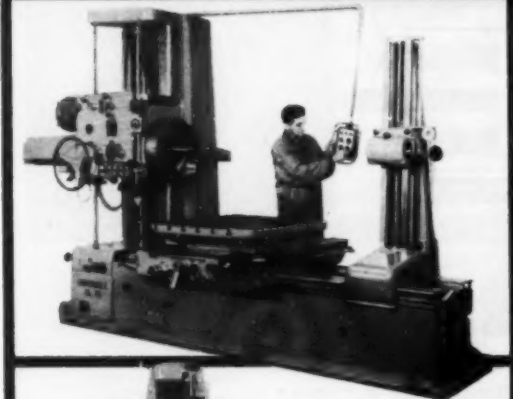
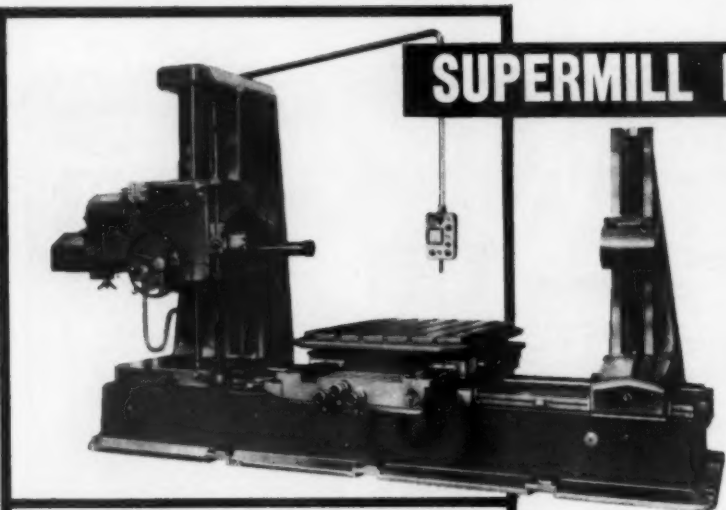
Send for Vee Bee's new catalog listing prices and specifications.



VEE BEE MANUFACTURING CO.
Muskegon, Michigan

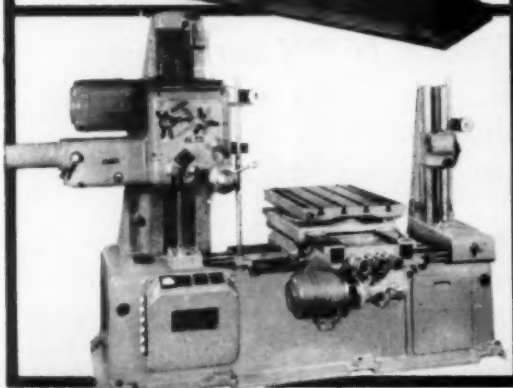
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SUPERMILL BORING



**4" BAR SIZE
MODEL AL 92**

**3" BAR SIZE
MODEL AL 76**



**2" BAR SIZE
MODEL AL 55**

VERTICAL BORING MILLS

SUPERMILL offers vertical boring mills from 24" up to 16' — of the most advanced design — the highest precision and low cost.

**Floor-type Horizontal Boring Mills from 4" up to 12"
PARTS, SERVICE and SHOWROOMS Coast to Coast**

✓	C
BAR SIZE	
2"	2
2"	4
3"	4
3"	7
4"	5

IG LLS Custom Built AT NO EXTRA COST!

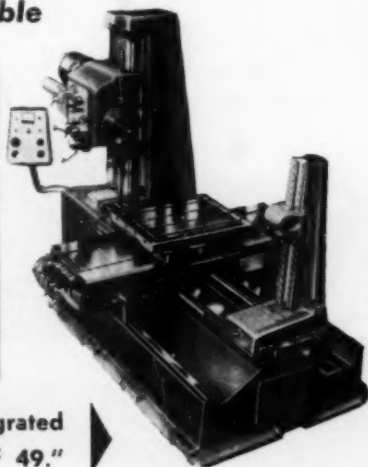
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✓ CHECK THESE TYPICAL PRICES!

BAR CROSS TRAVEL		VERTICAL TRAVEL	TABLE SIZE	COST
2"	23"	20"	28" x 22"	\$7,060
2"	45"	24"	24" x 36"	9,260
3"	44"	40"	36" x 48"	12,965
3"	72"	40"	48" x 120"	28,500
4"	55"	48"	48" x 60"	27,120



Heavy Duty Model A155 with 4 integrated ways permits cross table travel of 49."

Dealer
Inquiries
Invited

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140 53rd St.
Brooklyn 32, N. Y.

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TO SELECT
A
BORING MILL

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with GUTS it**



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So in manufacturing, Eimco uses tools of equal toughness . . . Morse tools that cut smoother, faster and last far longer . . . tools that cut your cutting costs right to the bone, *and keep them there.*

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means "THE MOST" in Cutting Tools

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BARNES-WELD

Welded Edge Power Blades

**GIVE YOU GREATER SAFETY,
EXTRA-LONG SERVICE LIFE!**



BARNES-WELD
CONSTRUCTION

The BARNES-WELD Power Blade combines shatter-proof safety with the high-production metal cutting characteristics of an all hard blade. A medium hard buffer strip is electrically welded between a high speed steel cutting edge and a tough, resilient back.

Cutting stresses are more uniformly distributed, greater beam strength is provided. The result is a blade that will absorb greater strains . . . even under heavy feed pressures and maximum operating speeds. The BARNES-WELD satisfies safety code requirements.

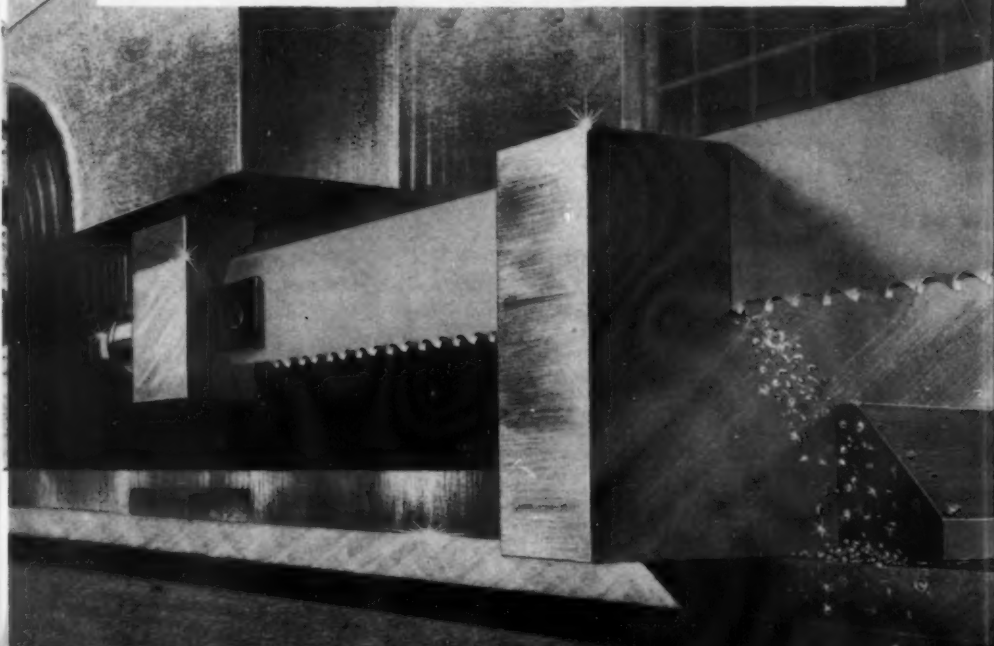
BARNES-WELD Welded Edge Power Blades give inexperienced operators, as well as skilled machinists, extra-long, extra-safe service life.

CALL YOUR BARNES DISTRIBUTOR



W. O. BARNES CO., INC.

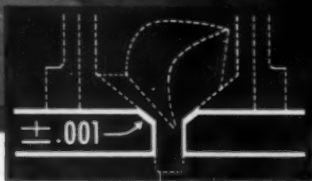
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SCHRILLO

ADJUSTABLE MICRO-STOP * COUNTERSINK

**Positive-Locking!*



Don't Take Our Word -

YOU BE THE JUDGE!

Never will you find so much value at so low a price! Highest quality steel and superb workmanship. Precisely engineered to provide instant finger-tip adjustment to .001" without the use of wrenches or tools. Self-lubricating oversize bearings. Ball-thrust friction-resistant operation guarantees longer trouble-free wear.

The Positive-Locking Micro-Adjustment assures controlled accuracy to a tolerance of $\pm .001$ " — to prevent costly production losses by over or under cutting. Glass-smooth shield will not scratch or mar work piece. May also be used interchangeably for precision trepanning or removing collars from Hi-shear rivets.

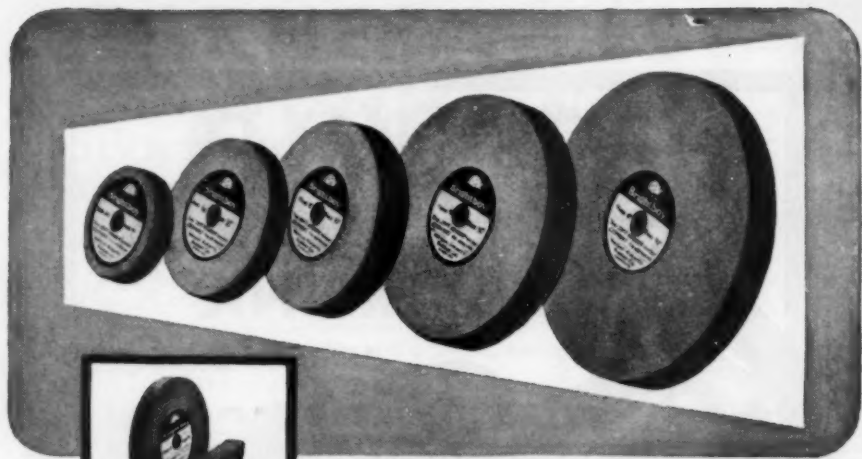
TWO SIZES: 4" for cutters up to $\frac{5}{8}$ " dia; $5\frac{1}{2}$ " takes cutters to $1\frac{1}{2}$ " dia.
For complete information about superb Schrillo Tools—write or phone for the all-new catalog No. 104F

SCHRILLO

AERO TOOL ENGINEERING COMPANY

8715 MELROSE AVE., LOS ANGELES 46, CALIF.

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MODERN BRIGHTBOY ABRASIVES

Replace older, costlier metalworking methods

Looking for cost savings? Improved product-quality? Simpler, faster production procedures? The many applications of Brightboy, the different finishing medium, will give you a broad, refreshing concept of metal working not usually associated with the scope of abrasives. **REASON:** Brightboy's compound—abrasive and rubber, working together in a unique action. Brightboy **BURRS, CLEANS, FINISHES, POLISHES**, in a single-step, time saving operation, frequently producing the final polish. Special surface effects, damaskeening, for instance, also can be achieved. *No fuss, no muss!*

WRITE US NOW for:

- Sample Brightboy Hand Tablet
- Catalog listing Grains, Textures, Machine Speeds
- New method recommendations and for name of nearest Brightboy distributor



Readily-available Brightboy **STOCK** numbers are **JOB-MATCHED** to your work to eliminate your need of special compounds. You have wide choice in Silicon Carbide and Aluminum Oxide grains, grades extra fine to extra coarse, in soft, firm and tough rubber binders. Wheels, sticks, rods and blocks for machine and manual operations.

TIME SAVING FEATURES

- Works to close tolerances
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- Produces conventional and special finishes and patterns, frequently the final polish
- No before-use preparation or dressing
- No skilled labor required

GENERAL USES

- Removing light digs, tool and heat marks
- Cleaning welded and soldered joints
- Burring and finishing castings, stampings, machined and molded parts
- Maintenance of tools and machinery

**BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.**

95 North 13th Street • Newark 7, N.J.

*America's Pioneer Manufacturer
of Rubber-Bonded Abrasives*

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IT HAS **QUALITIES** YOU WANT

Bunting

Alcoa Aluminum Bars

BUNTING

BEARING ALUMINUM

offers improved quality over low priced Bronze Bars and at a comparable price.

It possesses the important qualities which make a good sleeve bearing material, namely:

- Good heat conductivity
- Excellent embedability
- Good ductility
- High load-carrying capacity
- High resistance to corrosion
- Conformability to the shaft
- Good fatigue strength

Your Bunting distributor now has in stock 138 sizes of 13" tubular and solid Bunting Bearing Aluminum Bars. Write or ask for catalog and literature.

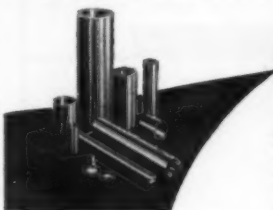
Other Products Available from Your Bunting Distributor

866 stock sizes of Bunting Cast Bronze Bearings and

267 sizes of Bunting Cast Bronze 13" Bars.

667 sizes of Bunting Sintered Oil-Alloyed Bronze Plain, Flange and Thrust bearings and 84 sizes of Sintered Bronze 6 1/2" Bars. Ask for Catalog 58.

343 sizes of Bunting Cast Bronze Electric Motor Bearings for all motors. Ask for Catalog 258.



Bunting.

BEARINGS, BUSHINGS, BARS AND SPECIAL PARTS
OF CAST BRONZE OR SINTERED METALS.
ALCOA® ALUMINUM BARS.

The Bunting Brass and Bronze Company, Toledo 1, Ohio
Branches in Principal Cities

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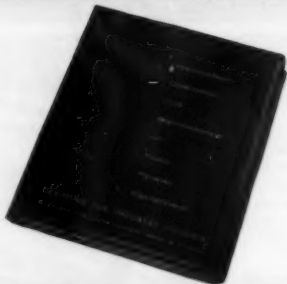
ASK HIM

Your Bunting distributor is listed in the classified section of your telephone directory usually under Bars—Bronze and Bearings—Bronze.

FLUID POWER . . .

"industrial hydraulics and pneumatics"

A new
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home study course
"Installation,
Operation,
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of F/P Equipment.



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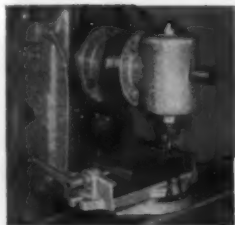
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Hitchcock's F/P course
for your
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employee training
program?
Send for
descriptive literature

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- A bright future for properly trained personnel
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- Talk it over with your management.

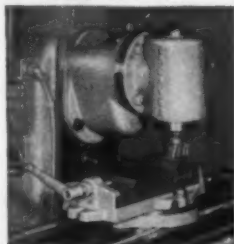
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WHEATON, ILLINOIS

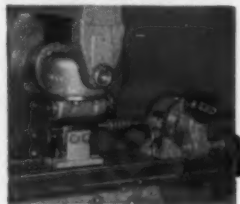
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Milling Attachment



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increase versatility
of dependable, low-cost**

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"THE MOST MILL FOR THE LEAST MONEY"

A full line of attachments and accessories offer outstanding flexibility for all types of milling operations . . . with GREAVES MILLS.

Make your own comparison of 22 specifications of Greaves and 7 other leading milling machines.



GREAVES MACHINE TOOL CO.

2600 Eastern Avenue, Cincinnati 2, Ohio

Send Comparison Chart. I will make my own comparison of GREAVES MILLS with other makes.

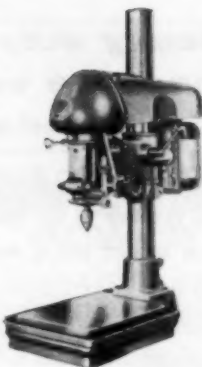
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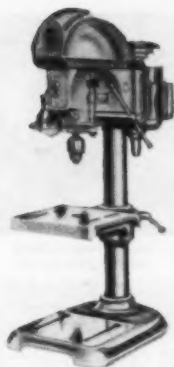
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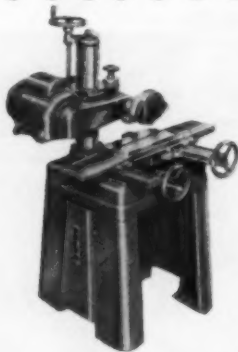
15" DRILL PRESS



14" SUPER-HI SENSITIVE



14" DRILL PRESS



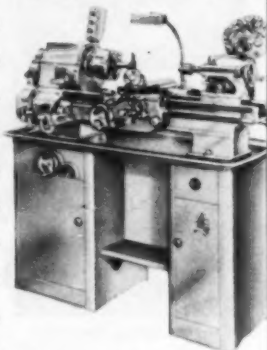
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Surface, Chipbreaker, Tool & Cutter



7" GRINDER

Also 6" Tool Grinder, 6" Bench



11" METAL LATHE—Also 10"

Hand Screw Machine

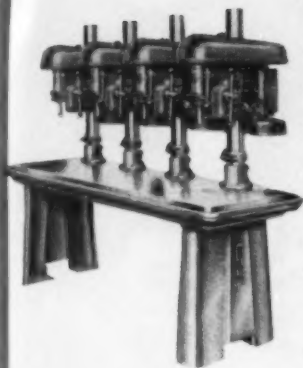
DELTA INDUSTRIAL

a proved way to cut

You can match the tool to your job for bigger savings—supplement or replace expensive, special-purpose machines—when you choose from the world's most complete line—53 Delta machines, 246 models, over 1300 accessories. Delta tools cost less to buy, operate, and maintain. They offer precision performance to meet exacting requirements

even under rugged, production-line use.

And because you can combine standard Delta components with automatic control devices, you can have the money-saving advantages of automation at a fraction of the usual cost. Ask your Delta Dealer about Delta "lo-cost automation"—he's listed under "TOOLS" in the Yellow Pages.



MULTIPLE SPINDLES



17" DRILL PRESS



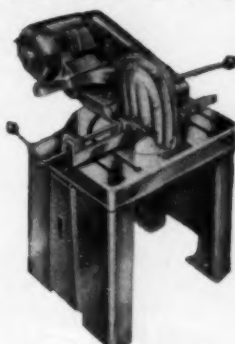
20" DRILL PRESS



14" METAL-WOOD BAND SAW
Also 20" & 14", 20" Wood



6" ABRASIVE BELT FINISHER
Also 12" Disc, 2 1/2" Belt Grinder



CUT-OFF MACHINE Wet & Dry
Abrasive, Non-Ferrous & Wood

PRODUCTION TOOLS

metalworking costs

FREE—Delta Industrial Catalog ... Get all the facts on the complete line of Delta metalworking and wood-working tools and accessories. Write: Rockwell Manufacturing Company, Delta Power Tool Division, 610G N. Lexington Avenue, Pittsburgh 8, Pennsylvania.



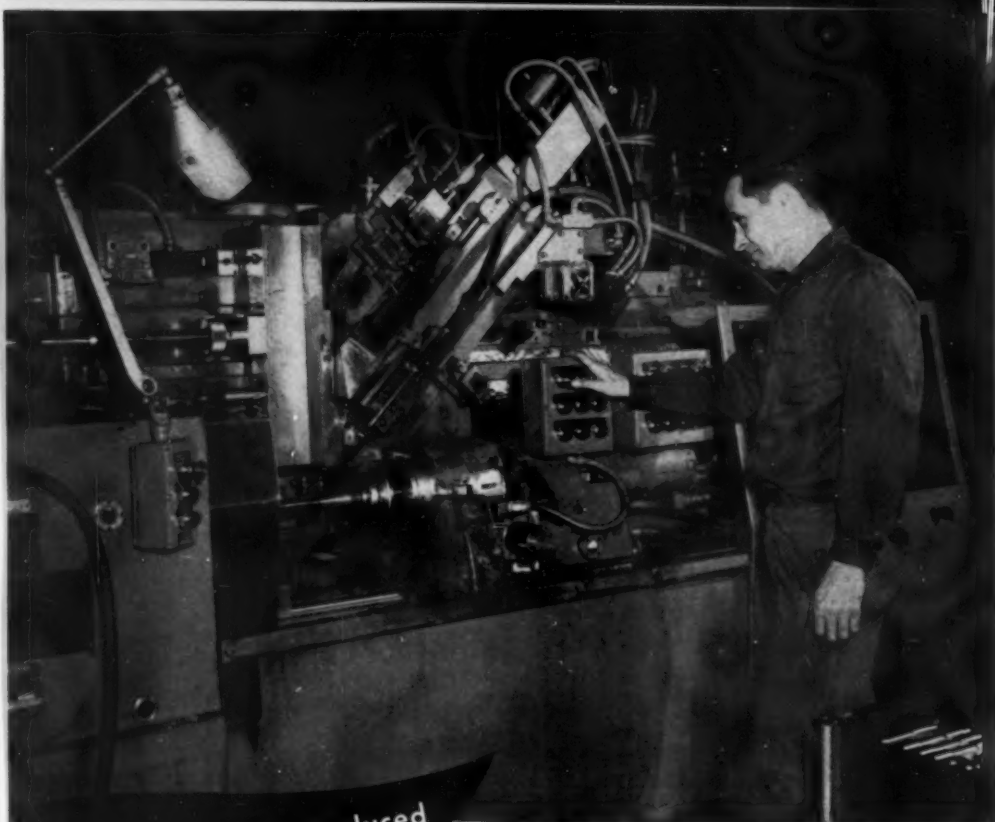
DELTA INDUSTRIAL TOOLS

another fine product by

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Machining Time Reduced
Over **25%**

on Valve Bodies
with

You, too, will share this enthusiasm for the Bullard Hydra-Feed Lathe - ask your Bullard Sales Engineer, Distributor or write for full information to



HYDRA-FEED LATHE

This "dollars and cents" saving is made possible, according to the National Supply Company, Toledo, Ohio, manufacturers and distributors of oil field equipment and supplies, for the following reasons: Minimum set-up time; Rugged construction; Ease of operation and Flexibility of feed rates.

Further, they are completely satisfied with the Bullard Hydra-Feed and, if ordering another machine for the same job, would consider purchasing another Bullard Hydra-Feed Lathe.

THE BULLARD COMPANY

BRIDGEPORT 9, CONN.

Mechanics Through The Ages

MUCH OF THE IRON

OF MID-19TH CENTURY GERMANY WAS PRODUCED IN TINY RURAL FURNACES OPERATED BY COTTAGERS WHO DOUBLED AS FARMERS! OFTEN, THESE WORKERS WORE THEIR WHITE CALF HIDE "FURNACE SKINS" WHILE LABORING IN THEIR FIELDS.



In early
MEDIÆVAL

TIMES, THE BELL FOUNDERS OF EUROPE USUALLY SET UP TEMPORARY FOUNDRIES, AND CAST THEIR BELLS, RIGHT ON OR NEAR THEIR CUSTOMER'S PREMISES!



THEY WERE USING
AN **AMERICAN BUILT**

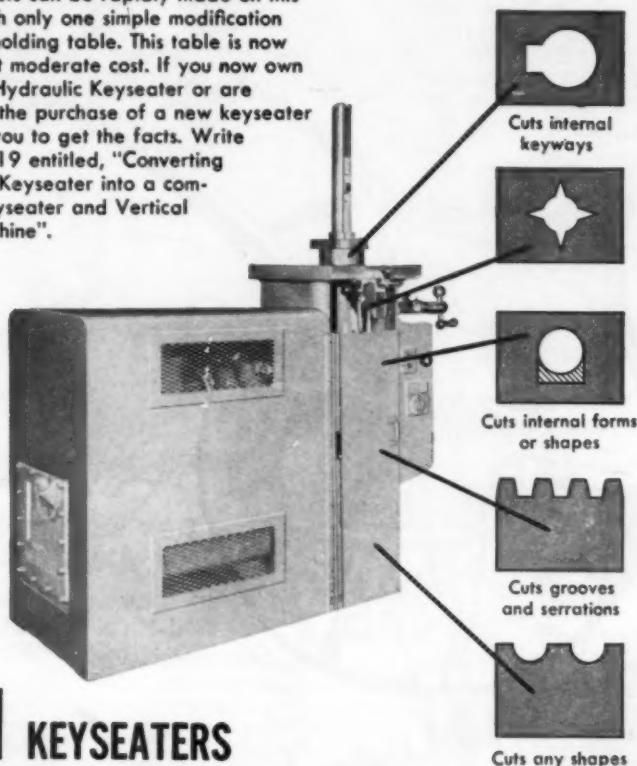
STEAM ENGINE
TO SAW 3000 FEET OF LUMBER
DAILY ON A LOUISIANA PLANTATION
150 YEARS AGO!



TRIPLE THE USEFULNESS OF YOUR **M&M** KEYSEATER AND VERTICAL CUTTING MACHINE

Simple modification greatly increases productive capacity of this versatile machine.

An M & M Hydraulic Keyseater is not only a keyseater that cuts internal keyways up to 5" wide but a vertical cutting machine as well. Serrations, grooves, teeth—a wide variety of cuts can be rapidly made on this machine with only one simple modification — a work-holding table. This table is now available at moderate cost. If you now own an M & M Hydraulic Keyseater or are considering the purchase of a new keyseater it will pay you to get the facts. Write for Bulletin 19 entitled, "Converting the M & M Keyseater into a combination Keyseater and Vertical Cutting Machine".

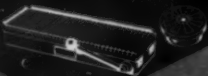


M&M KEYSEATERS AND VERTICAL CUTTING MACHINES

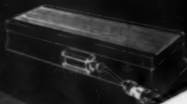
MITTS & MERRILL • 1015 S. Water St. • SAGINAW, MICHIGAN 98
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World's largest, most complete line of permanent and electro-magnetic and vacuum chucks

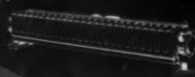
Walker permanent magnetic chucks utilize ceramic magnets which have *three times* the coercive force of alloy magnets. Rectangular chucks are available in 6 stock sizes, 6 x 10" to 12 x 24", rotary, from 4" to 60" dia.



Small, thin work is easily handled with Walker bar pole electro-magnetic chucks. Rectangular in 81 sizes, from 6 x 12" to 36 x 96"



In addition to the extensive range of stock sizes of permanent, electro-magnetic, and vacuum chucks and holding fixtures, Walker is your best source for "specials" for specific applications.



For complete information on the entire Walker line, write for Catalog No. 58.

O. S. WALKER COMPANY, INC.
WORCESTER 6, MASSACHUSETTS, U. S. A.

Walker Chucks are designed and engineered to give efficient and completely dependable performance in all applications. The incomparable combination of structural and operating features makes Walker Chucks your best buy in every way.

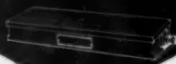
Holding jigs and fixtures are eliminated when you use Walker electro-magnetic chucks. Rectangular in 72 stock sizes, from 4 x 8" to 36 x 96", rotary, from 6" to 60" dia.



Walker has long been the leader in the field of demagnetizers. Stationary, hollow core demagnetizers are made to order in any size and shape of gap from 1" square up.



Walker vacuum chucks for holding non-ferrous parts are made to order in any desired size and shape. Favorites in the aircraft industry, they solve the problem of holding non-ferrous sheet stock. From 4" dia. to 10 ft. x 24 ft.



O.S. Walker

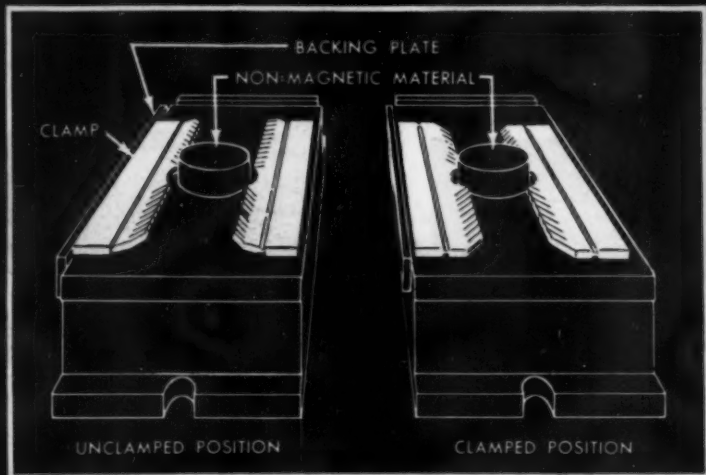
O. S. Walker—The Original Designers and Builders of Magnetic Chucks!

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Use your magnetic chuck to hold
non-magnetic materials, too!

Magna-Vise*

eliminates
cumbersome
fixtures



Work-piece is placed on chuck between jaws of Magna-Vise. When chuck is energized, jaws draw down firmly against chuck surface and hold work-piece solidly in place. Magna-Vise quickly repays its low cost. Four sizes, precision made. Priced from \$26.00 to \$52.00. Write Dept. N59.

*Pat. No. 2477297

MAGNA-LOCK, INCORPORATED

BIG RAPIDS, MICHIGAN, U.S.A.

produce your STAMPED COMPONENTS WITHOUT SECONDARY OPERATIONS

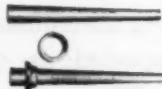
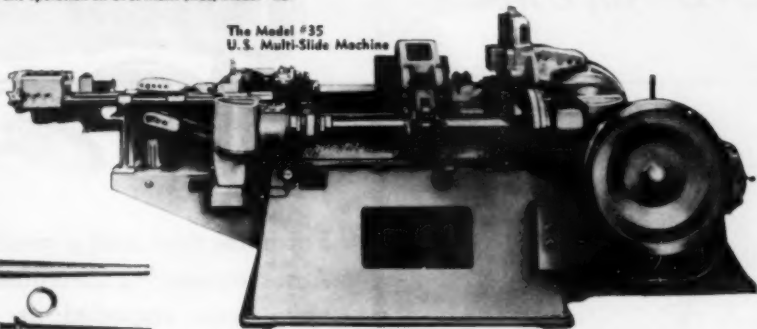


Steel Stamping, actual size, pierced, trimmed, counter-sunk, beaded and formed on various planes. Produced in one operation on U. S. Multi-Slide, Model #35.

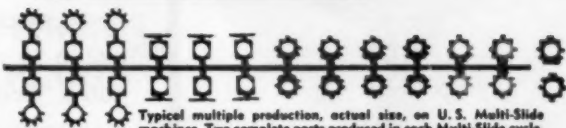


Brass Stamping, twice actual size, pierced, trimmed, formed, counter-sunk and tapped in one operation on U. S. Multi-Slide, Model #33.

The Model #35
U. S. Multi-Slide Machine



Aluminum conical tube, actual size, and shaped collar assembly. Both pieces produced and assembled simultaneously in a single cycle of U. S. Multi-Slide, Model #28.



Typical multiple production, actual size, on U. S. Multi-Slide machines. Two complete parts produced in each Multi-Slide cycle.

In a single U. S. Multi-Slide® cycle you can pierce — trim — countersink — bead — emboss — swage — tap — form — and assemble in almost any combination ● U. S. Multi-Slide "built-in motions" offer a practically unlimited variety of tooling possibilities. In One Operation you can produce components and assemblies that would ordinarily require multiple handling ● Stampings or assemblies produced on the U. S. Multi-Slide are consistently uniform and to required tolerances ● If you produce or purchase stamped components, investigate the cost saving potential of U. S. Multi-Slide machines. ● Ask for a copy of Bulletin 15-B or to compare manufacturing costs—send in samples or drawings of the part you want to produce.

U. S. TOOL COMPANY, INC. AMPERE (East Orange) NEW JERSEY

U. S. Multi-Slides® • U. S. Multi-Millers® • U. S. Automatic Press Room Equipment • U. S. Die Sets and Accessories



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*Masters of
Measurement*



200 SERIES

One of four sizes; made
to AGD specifications.

PORTA-CHECK®

A transistorized comparator
for fast, accurate measure-
ment to .00001".



For more than half a century,
Ames measuring instruments
have been regarded as the
finest available. Wherever pre-
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MANUFACTURERS OF MICROMETER DIAL INDICATORS AND GAUGES

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MACHINE and TOOL BLUE BOOK



*Another definition
of quality...*

PIPE MACHINERY HILO SET PLUGS

No effort is spared to assure maximum precision, maximum wear life for Pipe Machinery Hilo Setting Plug Gages. Each gage is carefully heat treated and stabilized, lapped, and checked twice for drunken thread during the manufacturing process.

Every Hilo Setting Plug is skillfully manufactured with two different pitch diameters having identical lead and angles. With the close tolerances built into this gage it will allow you to determine whether a ring is "bellmouthed" and within tolerance in a matter of seconds. All guess work and arguments are completely eliminated.

Little wonder that throughout industry Pipe Machinery's Hilo Thread Setting Plug Gages mean quality!

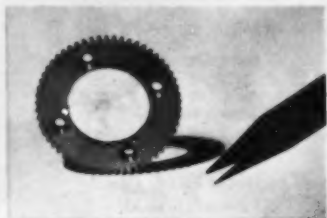
Write today for additional information.

THE PIPE MACHINERY COMPANY • 29100 Lakeland Boulevard • Wickliffe, Ohio

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See the sharpness of the shadow produced by a Mercury Arc Lamp!



This photo shows the sort of shadow you get with a Mercury Arc Lamp. Note the extreme sharpness of the shadow image's definition, even at 250 magnifications. This unprecedented sharpness means greater precision, greater efficiency in your inspection and measurement operations.

◀ Note the actual size of this gear, which is enlarged for inspection on the FC-30 Comparator screen. Gear has 57 teeth, and has 1.1159" dia. base circle.

IMPORTANT NEWS

for all users of J & L Optical Comparators!

Jones & Lamson introduces the J & L MERCURY ARC LAMP

... a revolutionary new light source

that makes your optical inspection more precise,

more efficient than ever before!

This new J & L light source unit gives more than 5 times the intensity of the best filament light source available today.

The light produced by the J & L Mercury Arc Lamp is actually a *new* kind of light . . . **you get a steady arc, with no flickering.** Its high intensity produces an incomparably bright screen with razor-sharp black shadow even at highest magnifications. Thus, accuracy of inspection and measuring is increased enormously. Now, you can literally "split tenths" with your J & L Comparator! (For use at low magnifications, the

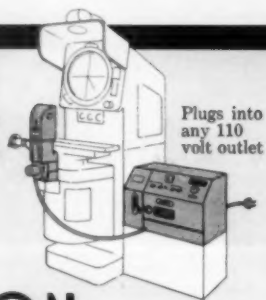
Mercury Arc light can be filtered readily.)

The J & L Mercury Arc Lamp comes as a complete packaged unit that is quickly interchangeable with the standard light source on any J & L 14-inch and 30-inch Comparator. This compact unit is a universal device to take various standard makes of mercury arc lamps.

For detailed information and specifications, or a demonstration, get in touch with your local Jones & Lamson representative, or write direct to Jones & Lamson Machine Company, Springfield, Vermont.

Jones & Lamson, the originator of optical comparators, proudly announces the J & L Mercury Arc Lamp, a remarkable development that tremendously improves and enhances the efficiency and precision of J & L 14-inch and 30-inch screen Comparators, old or new.

Interchanges
with regular
lamphouse in
minutes.

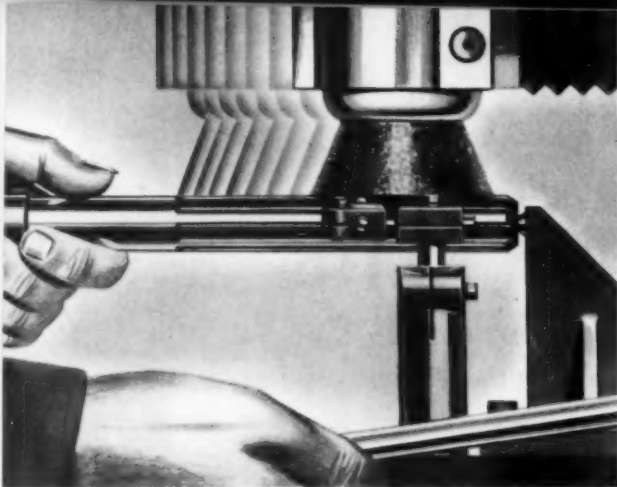


Plugs into
any 110
volt outlet



JONES & LAMSON

520 Clinton Street, Springfield, Vermont, U. S. A.



OLIVER "ACE" TOOL AND CUTTER GRINDER

Traverses the wheel—not the work!

You can grind tools and cutters more accurately with the Oliver "ACE" because the wheel is brought to the work, reversing the usual process. Abrasive dirt and grit cannot cause wear because the cross carriage is not in motion. The horizontal ram which supports the grinding head is fully enclosed—sealed against dust and dirt. Further accuracy is assured because the wheel is trued by a stationary diamond which provides a fixed grinding line. It is not necessary to reset the cutter to compensate for wheel wear.

The "ACE" is a tool and cutter grinder designed expressly for tool grinding—not a general purpose machine adapted to tool room work. It is simple to set up. All angles are obtained by direct reading. Operators stand in a natural position with the control lever in easy reach and the work in direct view.



Face mills, reamers, end mills, staggered tooth cutters, slab mills, spot facers—all cutters straight or spiral—are quickly, easily and economically sharpened with the Oliver "ACE". Both standard and heavy duty models are extensively used for sharpening carbide-tipped circular wood saws used in both wood-working and metalworking.

Write today for complete information. We'd appreciate the opportunity of sending a quotation.

OLIVER of ADRIAN

1408 E. Maumee St. • Adrian, Michigan

DRILL GRINDERS AND THINNERS—TOOL AND CUTTER GRINDERS—AUTOMATIC AND MANUAL
FACE MILL GRINDERS—TOOL BIT GRINDERS—CONTOUR SAWING AND FILING MACHINES

HOW TO REDUCE YOUR CUTTING TOOL COSTS

Three elements are absolutely necessary if there is to be a substantial reduction in cutting tool costs—the right tool, the right geometry of grind on that tool, and the right machine to produce the grind. There are various machines which will always be most suitable for specific applications. However, for the average cutter grinder jobs, Oliver has pioneered a new approach to the problem with the introduction of the "ACE" tool and cutter grinder.



The Heavy Duty "ACE"

The cost savings are attractive with respect to both setup time and grinding time. Setup usually consists of two simple "direct-reading" adjustments. The first setting is made to produce the angular or straight line grind requirement. The second setting consists of tilting the grinding wheel spindle to produce the proper clearance—all extremely simple.

Grinding time is reduced considerably because tool travel is eliminated in most cases. Thus the time consists wholly of bringing the grinding wheel on and off the cutting tool. This compares extremely favorably with competitive grinding procedures.

This combination of easy setup and rapid grinding is found only on the economically priced Oliver "ACE" tool and cutter grinder.

There are two versions of the "ACE": the standard, which is suitable for high speed and light duty carbide grinding, and the heavy duty model which is designed for grinding tungsten carbide cutters and tools in all of their many forms.

Use postpaid card. Circle No. 238

YOU KNOW IT'S ACCURATE

... when it's set up on a **BRYANT GRANITE SURFACE PLATE**

Patented, "head of the grain" finish for surface-wide wear resistance . . . unequalled true quartz granite with clearly defined flatness! Wide choice of standard and special sizes, available with welded steel stands.



... when it's checked on a **BRYANT PRECISION THREAD GAGE**

Bryant B-21 Bench Gage checks I.D. and O.D. threads in all tolerance classes to 5" dia., checks special grooves, snap ring or O-ring grooves, checks squareness of face (attachment illustrated) and concentricity of diameters—and does it 8 to 10 times faster!

Full complement of standard and special accessories makes the B-21 Bench Gage indispensable to product quality control.



FREE FACT-FOLDERS—
Engineering data and
prices on Bryant Thread
and Groove Gages. Also
—the full story of Bryant
Surface Plates.

EX-CELL-O
CORPORATION

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FOR
PRECISION



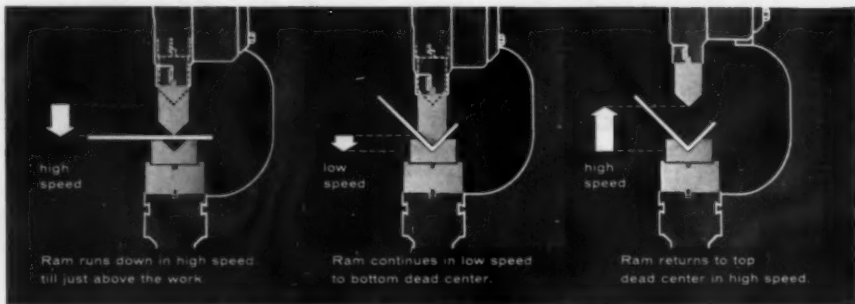
GREENVILLE PLANT, 945 E. SATER ST., GREENVILLE, OHIO

EX-CELL-O PRECISION PRODUCTS INCLUDE: MACHINE TOOLS • GRINDING AND BORING
SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS
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AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

29-347

INCREASE PRODUCTION AS MUCH AS 60% WITH CINCINNATI®

Automatic Cycle Press Brakes



If you form long, flexible parts, you can increase your production up to 60% with a Cincinnati Automatic Cycle Press Brake.

A new, exclusive feature, the Cincinnati Automatic Cycle provides a combination of instantaneous fast and slow ram speeds with every stroke. As a result, you get maximum production speed without the "whip up" and "back bending" which often occur in high speed forming of long parts which have no beam strength.

You no longer have to rely on the operator's skill at clutch slipping to obtain parts that are free of "back bends."

You can get this money-making feature on all new 7 and 9 Series Cincinnati Press Brakes.

This productive new feature means a lot of advantages for you:

1. Job records show 10% to 60% increase in parts formed per hour.
2. Low speed portion of the ram stroke can be set so that all strokes are identical in length.
3. Rejects caused by "back bends" are stopped.
4. Highly experienced operators are not required.
5. Operator fatigue is greatly reduced because there is no need for clutch slipping.
6. Clutch and brake are long-life, minimum-maintenance units requiring no adjustments.

Write Dept. H for full details about the Cincinnati Automatic Cycle, Bulletin B-9R.

Shapers / Shears / Press Brakes

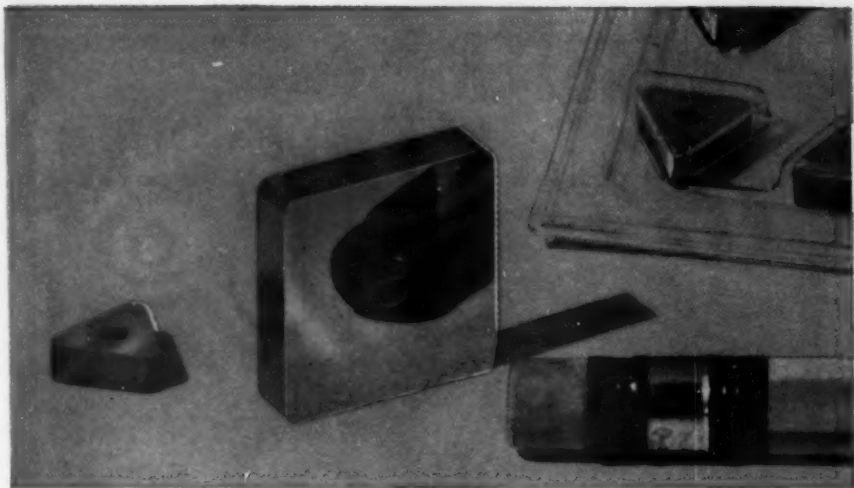
THE **CINCINNATI**
SHAPER CO.



Cincinnati 11, Ohio, U.S.A.

Use postpaid card. Circle No. 240

MACHINE and TOOL BLUE BOOK



CARMET INDEXABLE INSERTS NOW LAPPED TO A MIRROR FINISH to reduce chip wear and increase tool life



New Handy Plastic Slide Package

Individual pockets of heavy gauge, clear acetate now make it easy to check your Indexable Insert stock. Slides open for instant dispensing. Cardboard back carries Style, Grade and Quantity numbers plainly stamped. An index of grade markings of Indexable blanks for quick identification is included.

WRITE FOR FREE CATALOG C-16

"Carmet Cemented Carbides for Industry"

This 32-page first edition has prices and complete specifications on Carmet's full line of cemented carbide tipped tools, Indexable Inserts, blanks and holders. Speed and feed charts, grade comparisons, ordering information included.

ADDRESS DEPT. MB-19

Here's another Carmet "first" that cuts machining costs. Top surfaces of Carmet Indexable Inserts in all grades are now lapped with a super-fine grit diamond wheel to a bright mirror finish. And prices stay the same.

Chips just slip by on contact, so cratering and chip wear are reduced to a minimum. This low micro-inch finishing makes cutting edges stronger, too. Burrs and feather edges that contribute to early chipping are actually honed away. Cutting is cooler and more even. The tendency of some materials to stick is greatly reduced. Seating of the insert is highly improved to minimize the hazard of breakage when clamping.

Your Carmet distributor has Indexable Inserts in stock. He knows carbide tooling. Call him for any information you may want on grade selection, tool design or Tool holder styles to make your current jobs more profitable. Or write Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Michigan.

WSS 7401 A

CARMET

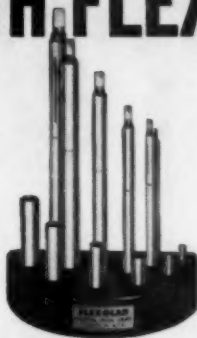
CEMENTED CARBIDE DIVISION OF
ALLEGHENY LUDLUM STEEL CORPORATION



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LAP FASTER

more accurately **WITH FLEXOLAP**



Flexolap features an expansion barrel with off-center longitudinal slots that "give" under pressure of the adjusting pin —allow up to 15% expansion. Easy, accurate take-up saves valuable time, enables you to lap rounder, straighter holes. Extra flexibility eliminates danger of galling or seizing.

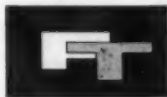
SET NO. 1

includes 6 complete laps, one of each size ($\frac{3}{16}$ ", $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{3}{4}$ "), and one additional brass barrel of each size, all on a sturdy stand. \$14.00

OTHER SIZES

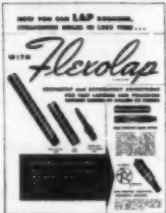
available are $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{1}{4}$ ", $\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", and Midget Laps in sizes .032, .036, .040, .046, .054, .062, .070, .079, .090, .104, .120, .135, .155, .170, .187, .218 and .250. Trial assortment of 17 midget laps, \$2.10

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FEDERAL TOOL CORPORATION

3600 W. Pratt Blvd., Chicago 45, Illinois



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MACHINE and TOOL BLUE BOOK



Now You Can Convert Your Brown & Sharpe Automatic Screw Machine to Air Chucking



It is now possible to convert the Brown & Sharpe Automatic Screw Machine to power chucking by means of a Skinner power chucking unit designed for the Models 2 and 2G.

The Skinner power chucking unit consists of a 4-inch air chuck with two or three jaws, soft blank work-holding top jaws, a threaded draw bar, a rotating air cylinder, a cylinder adapter and a control valve. This unit can be installed easily in ninety minutes by any set-up man.

With the addition of this Skinner power chucking unit, your Brown & Sharpe Automatic Screw Machine

can chuck cold drawn and odd shaped parts at higher speeds and at less cost.

For greater production, automatic feed hoppers, work ejectors and automatic cam controls can be added to provide automatic chucking that will permit an operator to tend more than one machine.

If you plan to purchase a Brown & Sharpe Automatic Screw Machine ask to have the Skinner power chucking unit included. To convert your present Model 2 or 2G, contact a Skinner Representative or write to us at Department 147.



THE CREST OF QUALITY

SKINNERCHUCKS

THE SKINNER CHUCK COMPANY • NEW BRITAIN, CONNECTICUT

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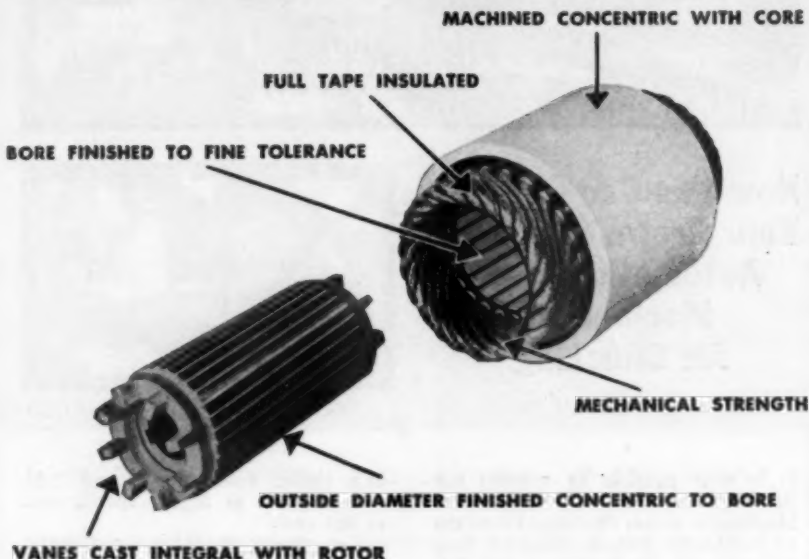
JULY, 1959

43

Serving the Industry Since 1852



WOODS SHAFTLESS MOTORS



The application of direct motor drive with WOODS' Shaftless Motors to high-speed spindles brings the peak of motive efficiency at relatively small cost. Conserves space—eliminates belts and gears—fewer wearing parts. The extensive and varied lines of WOODS' Shaftless Motors are available for nearly every class of direct application.

Let us tell you how you can achieve a reduction in production costs by direct motor drive.

MOTOR DIVISION

S. A. WOODS MACHINE CO.
27 DAMRELL STREET
BOSTON 27, MASS.

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Users Say: "Improvements Result in
Even More Profitable Production!"

"BUFFALO" **NO. 15 DRILLING** **MACHINES**



For more than 25 years the "Buffalo" No. 15 Drill has been famous for *value* in terms of *production efficiency*. Today, more and more users are reporting that the many new features of these rugged, reliable machines add up to even greater productive value in their shops.

A few of the No. 15 Drill improvements:

- Correct belt tension automatically maintained.
- Convenient step-to-step belt changing on pulleys.
- Time-saving front-mounted start-stop switch.
- Easy-to-read speed range table.

Bench, floor and pedestal models are available in the new line of "Buffalo" No. 15 drills. Bench and pedestal types in one to six-spindle models. Tapping, mortising, routing and spot-facing attachments may be ordered.

Your "Buffalo" machine tool dealer will be glad to demonstrate the many advantages of the new No. 15 drill. Call him today, or write direct for bulletin 4024.



BUFFALO FORGE COMPANY

161 Mortimer Street • Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING BENDING



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WHICH IS MOST IMPORTANT TO YOU?



**Power
Speed
Versatility
Capacity
Quick Setup?**



Gisholt No. 12 Automatic Chucking Lathe

You don't have to sacrifice one advantage for another because here is an ideal combination of all in the industry's most modern high-production automatic chucking lathe.

This Gisholt No. 12 is quickly set up to save you time and money on continuous, high-speed production or a wide variety of parts in small lots. It can take practically any part up to 16½" in diameter.

COST-CUTTING VERSATILITY. With 420 spindle speeds ranging from 40 to 2600 r.p.m. and an infinite selection of feeds, it gives you top efficiency in all phases of every job—cutting costs all the way.

INCREASES OPERATOR PRODUCTIVITY. Each machining step is handled in rapid automatic sequence—freeing your operator to handle additional machines.

GREATER POWER, GREATER ACCURACY. Constant h.p. motor (up to 40 h.p.) on the No. 12 takes full advantage of today's most advanced cutting tools and tooling

techniques. Greater weight and rigidity allow heaviest cuts at punishing speeds without vibration.

COMPLETE RANGE OF ACCESSORIES. Front, rear, auxiliary and overhead slides can be used; angular cuts are easily made, JETracers can be used with greatest efficiency. Automation can be incorporated—from simple loading and unloading to gaging and sorting of finished pieces.

Your Gisholt Representative will gladly show you how the No. 12 Automatic Chucking Lathe will pay for itself in your plant. Call him, or write for Bulletin 1213.

GISHOLT
MACHINE COMPANY



Madison 10, Wisconsin

Investigate Gisholt's Extended
Payment and Leasing Plans

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading
Lathes • Factory-Rebuilt Machines with New Machine Guarantees

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Get the
SOLID POWER
of a Remington drill

Chips fly when Remington power tools bite into steel. They're tough to wear out, too, because of the solid way Remington builds them. Remington manufactures a broad and versatile line. In drills alone, choose from 21 electric-powered or 11 air-powered models. Each is serviced for parts or repairs from a nationwide network of Remington Service Stations. It makes sense any way you look at it to specify Remington for all your portable power tool needs. Write for free descriptive catalogs—there's no obligation.

CHOOSE THE POWER MOST
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POWER TOOLS ARE AVAILABLE IN
**AIR • ELECTRIC • GASOLINE
AND POWDER-ACTUATED
MODELS**

Remington

Remington Arms Company, Inc., Bridgeport 2, Conn.
IN CANADA: Remington Arms of Canada, Limited,
36 Queen Elizabeth Blvd., Toronto 18, Ont.

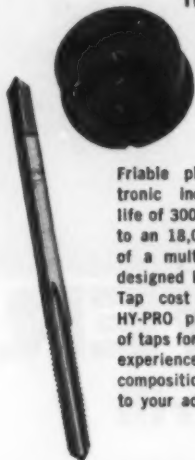


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HY-PRO specialists deliver savings as high as 98% with taps of special design

When you need special taps, you can rely on HY-PRO engineering ability and experience to deliver maximum savings . . . in tap expense, in production time.

from
300 to 18,000
holes per tap



Friable plastic part for electronic industry. Previous tap life of 300 holes-per-tap boosted to an 18,000 rate with the use of a multi-fluted tap specially designed by HY-PRO specialists. Tap cost saving — 98% plus. HY-PRO pioneered development of taps for plastics and has wide experience with all types of compositions that can be applied to your advantage.

Tap Cost SAVINGS **98%**



The Tap Engineering Specialists

NEW BEDFORD, MASS., U.S.A.

CALL YOUR LOCAL HY-PRO DISTRIBUTOR FOR STANDARD TAPS FROM STOCK

Use postpaid card. Circle No. 242

from
100 to 800
holes per tap



Stainless steel aircraft part. HY-PRO tap of special design raised tap life from 100 holes-per-tap to 800. Threading with the original tap was rough, varying over tolerance. With the HY-PRO special, it is smooth, clean, consistently Class 3. Savings in tap cost — 88%; plus an additional big saving gained by eliminating rejects previously scrapped because of inaccurate threading.

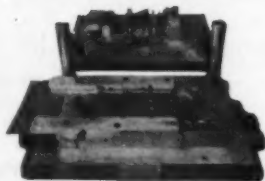
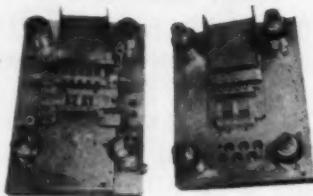
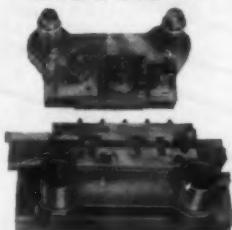
Tap Cost SAVINGS **88%**

Consult a HY-PRO specialist. Whether you need standard or special taps, he can show you how to get lowest tap cost per hole. Write Dept. G.

ASK FOR STOCK LIST OF SPECIAL TAPS
AVAILABLE FOR IMMEDIATE DELIVERY

HY-PRO TOOL COMPANY
DIVISION OF CONTINENTAL SCREW CO.

Produced by
LATROBE
for long-run
dies...



Metalmasters



Fully-Uniform...

Free-Machining

DESEGATIZED® **OLYMPIC FM**

High Alloy Die Steel

When your die production calls for long-run service... and you need a die steel that yields a superior machine finish without tearing—one that has excellent non-deforming characteristics in heat treatment... that's the time to use Latrobe's OLYMPIC FM.

OLYMPIC FM is an air hardening 12% chromium (D-2 type) die steel made to exacting standards by Latrobe Metalmasters... guaranteed to be fully-uniform in the distribution of wear-resisting carbide particles and alloy sulphides for better machinability... a result of Latrobe's exclusive DESEGATIZED® process of manufacture!

There's a wide range of Olympic FM sizes stocked at branch warehouses near you—Call today!

✧ Or send for Olympic FM Data Sheet today!



LATROBE STEEL COMPANY

MAIN OFFICE and PLANT: **LATROBE, PENNSYLVANIA**

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*Your advertisement
in this 1960 edition
will give you...*



ASSURANCE that your product story will be in the hands of 30,000 key buying influences in the metalworking industry thruout 1960.

COMPLETE COVERAGE in the book . . . including cross references to your advertisement in the Products Index and Manufacturers Address section, listings of your products in the Advertisers Index and the listing of your distributors in the Distributors sections.

INSURANCE that important people who may never be seen by your salesmen will have your product story . . . company and product identity insurance.

CONFIDENCE that your advertisement will go on working for many years, familiarizing persons who will some time be primary buying influences with your name and products.

A CHECKING COPY of this valuable, hard-covered, sewn, "desk-size" volume for your own use.

. . . so reserve space now!

**HITCHCOCK'S MACHINE AND TOOL DIRECTORY
WHEATON, ILLINOIS**

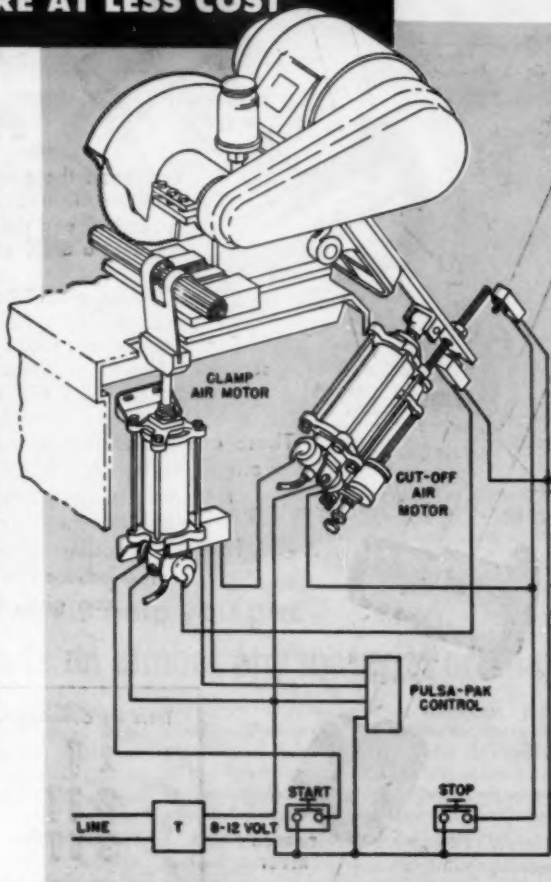
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HOW TO MAKE A CUT-OFF SAW PRODUCE MORE AT LESS COST

Shown at the right is a SPOT-A-MATION IDEA used in many plants. Almost invariably it has meant cost savings of 50% or more—has improved product quality, lengthened saw life, lessened worker fatigue.

Two Bellows Air Motors are used. One, hydraulically controlled, feeds the saw through the work. The second clamps the work in position. The two Air Motors are electrically interlocked. The cut-off saw can be made completely automatic by adding a third Air Motor to feed the material.

This is another typical way Bellows Air Motors are used to "Spot Modernize" existing equipment. Almost any hand fed, or hand-controlled machine can be made to produce more, at less cost, with versatile Bellows "Controlled-Air-Power" Devices.



**THIS SPOT-A-MATION
IDEA FILE IS
YOURS ON REQUEST**

Contains drawings, circuit diagrams, equipment list, and full details to enable you to convert existing equipment to lower cost operation. Write for it today. No obligation.

Address Dept. MTB-759, The Bellows Co., Akron 9, Ohio.

1285-B

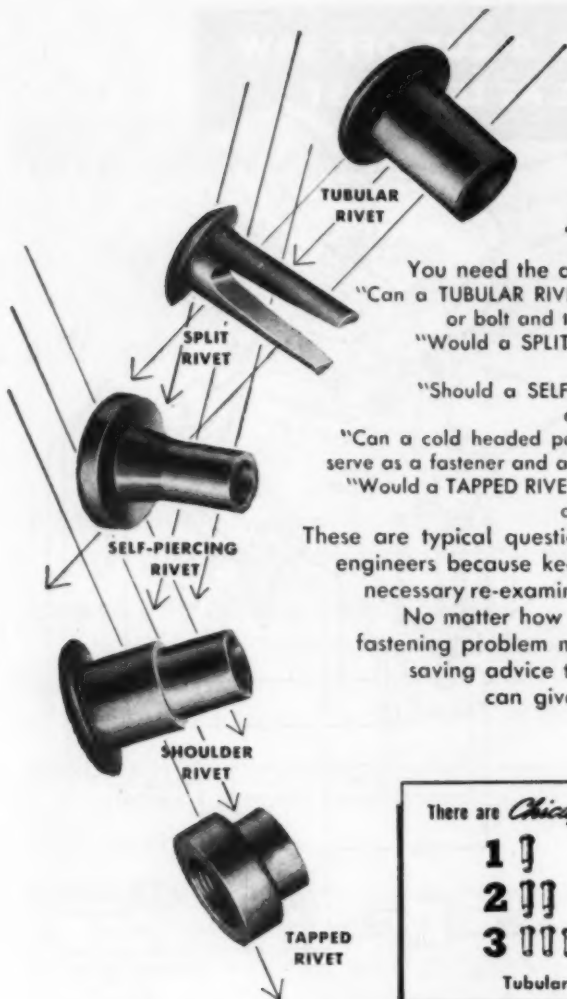
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IBEC: Sinclair-Collins Valve Co.,
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The Bellows Co.

DIVISION OF INTERNATIONAL BUSINESS MACHINES CORPORATION
AKRON 9, OHIO

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TIME TO LOOK AT COSTS



You need the answers to such questions as:

"Can a TUBULAR RIVET replace a solid rivet, screw, or bolt and thereby accelerate production?"

"Would a SPLIT RIVET with a decorative head improve product appeal?"

"Should a SELF-PIERCING RIVET be used and eliminate a drilling operation?"

"Can a cold headed part such as a SHOULDER RIVET serve as a fastener and also provide a bearing surface?"

"Would a TAPPED RIVET, made to receive a screwed-on assembly simplify field service?"

These are typical questions asked of Chicago Rivet engineers because keen competition today makes necessary re-examination of production methods. No matter how complex or how simple your fastening problem may seem to be, get the cost saving advice that Chicago Rivet engineers can give. Send blueprint or sample assembly—no obligation.

There are *Chicago Rivet* Machines that will set

1	2	4	5	6
1	2	4	5	6
1	2	4	5	6
1	2	4	5	6

Tubular or Split Rivets At a Time

Chicago Rivet & MACHINE CO.

947 S. 25th Ave. - Bellwood, Ill. (Chicago Suburb) - Branch Factory: Tyrone, Pa.

FOR YOUR FILES—Rivet catalog describing 1388 standard tubular and split rivets and 26 single and multiple automatic rivet setters.



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MACHINE and TOOL BLUE BOOK

Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

ACCO
for Better
Values



How Allison Wheels help you get Quick, accurate cuts on almost any material or shape

• Abrasive cutting can give you *cleaner* cuts, *faster*—on almost any material from titanium to fire brick. But only with the proper cut-off wheel can you get best results. That's where your ALLISON-CAMPBELL Field Engineer can help. He can select the ALLISON wheel to cut metals and other hard materials at speeds of just a few seconds per square inch—fine finish, no burn, with little or no burr—accuracy within close tolerances. There's an ALLISON wheel for every abrasive cutting job.

Resinoid bonded wheels • for dry abrasive cutting at speeds of 3 to 5 seconds per sq. in.
Rubber bonded wheels • for wet cutting of

all types of steel, alloys, titanium, glass, plastics. **Masonry cutting blades, including reinforced types** • for wet and dry cutting of fire brick, concrete block, tile, other building materials. **Fiberglass reinforced wheels** • for extra strength on many foundry jobs.

GET THE COMPLETE STORY! • Write for Bulletin DH-214 for detailed information on abrasive cutting and wide selection of ALLISON wheel specifications. ALLISON wheels available 3" to 34" diameter, .006" to 3/16" thick. And remember—your ALLISON-CAMPBELL Field Engineer can give you specialized help. Specify ALLISON wheels for efficient, accurate, economical cutting.



ALLISON ABRASIVE CUTTING WHEELS

Allison-Campbell Division • American Chain & Cable Company, Inc.
937 Connecticut Avenue, Bridgeport 2, Conn.

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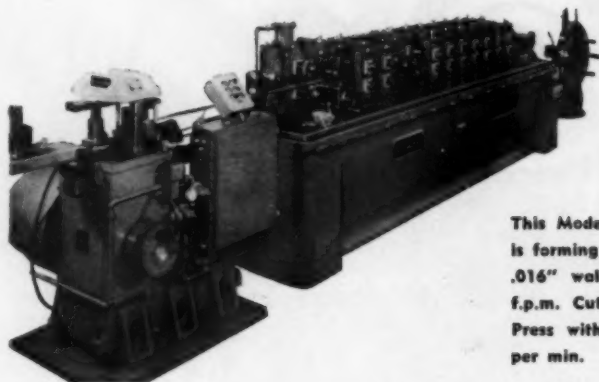
JULY, 1959

53

AMERICAN ROLLER DIE CORP.
ARDCOR

NEW LOCK SEAM TUBE MILL

Maximum Capacity Up To 1" O.D.



This Model SF Lock Seam Tube Mill is forming TV table legs of $\frac{5}{8}$ " O.D., .016" wall simulated brass, at 120 f.p.m. Cutoff is ARDCOR Model 10 Press with $1\frac{1}{2}$ " stroke, 60 strokes per min.

The new small Model SF ARDCOR Machine features: High production speeds; roll space 5.5"; spindles 1.5"; new style rugged base with tool compartment and slanted front recessed for better operator stance; special narrow side roll stands with close 10" horizontal centers; fixed spur gears; quiet running all V-belt drive compact 3-roll straightener; low voltage protection. Basic machine readily converted to a Cold Roll Forming Machine.

ARDCOR Roll Forming Machines and Lock Seam Tube Mills are available in seven standard sizes, other sizes to customer specifications.

If your products can be cold roll formed, ARDCOR engineers can supply advancements in design and machine construction to produce them better . . . at greater speeds and profit.

Consult our Engineering Facilities, without obligation . . .

American ROLLER DIE CORP.
29560 Clayton Avenue Wickliffe, Ohio



DESIGNERS, ENGINEERS AND BUILDERS Single Roll Forming Machines or Completely Automated Production Lines for Cold Forming, Ferrous and Non-Ferrous Electric Weld and Lock Seam Tube Mills • Forming Rolls, Tubing and Pipe Rolls • Straightening, Pinch and Leveller Rolls • Cut-Off Machines • Slitters

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MACHINE and TOOL BLUE BOOK

NOW READY... the

NEW

edition of industry's favorite
guidebook for transmission design
and maintenance economy.

COMPLETE CATALOG No. 57

REPLACES THESE THREE CATALOGS



No. 56



No. SC-3



No. OP-1



Lists NEW Gears and gear information. NEW expanded line of Sprockets and Chain for any drive $\frac{1}{4}$ " to 2" pitch. NEW OPTIMOUNT helical geared Speed Reducers, shaft mounted and base mounted. NEW types and sizes in every product line. 664 pages, with 58 pages of improved selection charts and engineering information to help you simplify transmission planning. Boston Gear Works, 81 Hayward St., Quincy 71, Mass.

YOUR COPY IS NOW AVAILABLE FROM...

YOUR
NEARBY

BOSTON
DISTRIBUTOR *gear*



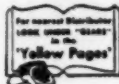
— STANDARDIZATION PAYS —

NOW 9496

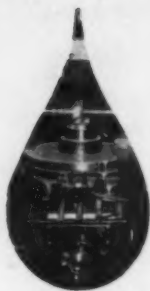
STANDARDIZED POWER TRANSMISSION PRODUCTS

Stock Gears • Sprockets and Chain
Speed Reducers • Bearings
Pillow Blocks • Shaft Supports
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FROM STOCK!

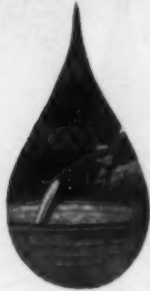


"Summer Odor" from



SOLUBLE OIL

+



WATER

+



PSEUDOMONADS

...can be controlled

Nearly everyone has experienced the "rotten egg" smell of spoiled soluble oil emulsions. Here's what causes it . . . and how you can control it with Elcide 75.

THE CAUSE: The oil-and-water mixture of a standard-duty soluble oil emulsion produces ideal feeding conditions for certain bacteria. One of the most common types, *pseudomonads*, can be found in all emulsions. Once established, they multiply rapidly . . . especially in warm weather . . . and feed on the emulsion.

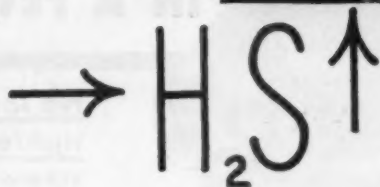
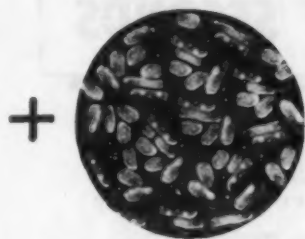
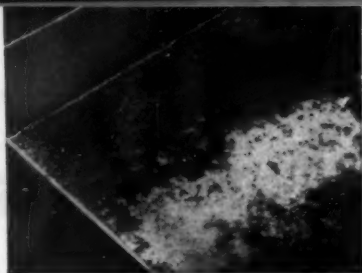
As these pseudomonad colonies build up, they set the stage for a secondary contamination by sulfate-reducing bacteria. These bacteria feed on the petroleum sulfonates commonly used

as the emulsifying agent in soluble oils. As they multiply, they throw off H_2S , the hydrogen sulfide gas known in the industry as "summer odor."

Unfortunately, the damage from bacterial contamination does not end here. As the odor develops, the bacteria continue feeding on the emulsifier until the emulsion breaks. This process changes the mixture from alkaline in composition to corrosive acid. Other by-products from the bacteria form a slime that clogs screens and filters, and presents certain hygienic hazards.

ELI *Lilly* AND COMPANY • AGRICULTURAL AND INDUSTRIAL PRODUCTS DIVISION

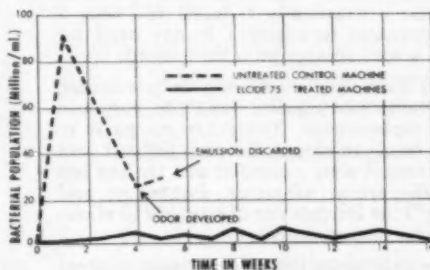
rancid emulsions



SULFATE REDUCING
BACTERIA

(SUMMER ODOR)

with ELCIDE 75



This plant-test record shows bacterial build-up in an untreated emulsion. The downward curve is where secondary contamination by the sulfate-reducing bacteria starts final destruction. The Elcide 75-treated emulsion lasted 5½ times longer.

THE CURE: ELCIDE 75 hits this problem at the first stage of bacterial growth. Because Elcide 75 is a new, wide-spectrum inhibitor, it attacks and controls a wider range of bacteria, and the mutants which frequently develop. Just one ounce of Elcide 75 in

each 4 gallons of fresh emulsion breaks the vicious cycle of bacterial growth before it starts . . . thereby greatly extending the life of your coolant.

ELCIDE 75 is a reliable way to prevent the waste of frequent emulsion changes. Its wide range of anti-bacterial action insures a constant control that not only prevents "summer odor," but also reduces production costs. Many plants have thoroughly tested Elcide 75. They found Elcide 75-treated emulsions last far longer, reduce downtime and oil concentrate costs, and increase total productivity.

If you have not yet tried Elcide 75 in your plant, we urge you to try it now . . . before the heat of summer further inflates your personnel problems and operating expenses.

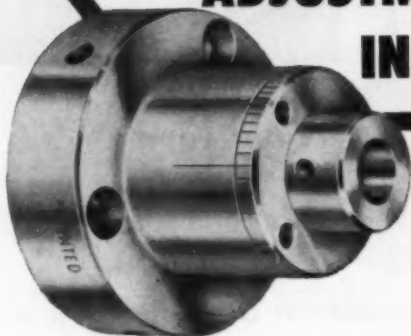


ELCIDE 75TM
PATENT PENDING

KEEPS COOLANTS FRESH AS A DAISY!

INDIANAPOLIS 6, INDIANA
TELEPHONE: MELROSE 6-2211

Briney Precision Boring Heads Permit ADJUSTMENTS TO TENTHS IN A FEW SECONDS



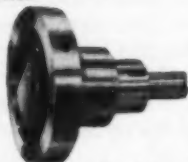
BRINEY

SIZE-POSITIVE BORING HEADS

are also designed for special boring applications. Some examples



- Special Briney Boring Head for bottom facing and I.D. boring with precision depth and bore control.



- Special Briney Head for automatic retraction and feed out.
- Miniaturized heads for cluster boring.
- Block-type tooling for precision boring and O.D. turning used on vertical or horizontal bed multi-purpose machines.

No loosening or tightening of any screws required. Just rotate a graduated adjusting collar with a spanner wrench

NOW, the patented Briney Principle incorporated into a new precision boring head design and construction gives you all-around savings never before possible. Initial set-up time is drastically reduced and only a few seconds is required to adjust a Briney head for operational tool wear. Scrappage is minimized.

The head is of built-up construction on pre-loaded balls to offer extreme tool rigidity, long life, easy and economical bar replacement. There are no parts to wear that could result in sloppy fits and difficult tool wear adjusting control after extended use. On the job tests indicate balls act as vibration dampeners and eliminate chatter. Fine finishes are obtainable to eliminate many secondary operations.

Size-positive adjustments permit precision control over bore sizes. Very slight bar offset permits speeds up to 9000 rpm, minimizing out-of-balance operation. Manufactured from high quality tool steels and finish ground all over for balance controlling purposes. Every head, special or standard, is individually calibrated after assembly to assure size-positive adjusting control.

Six standard styles to fit most boring applications available off-the-shelf for quick delivery at prices you normally pay for ordinary boring heads.

WRITE TODAY FOR CATALOG and see for yourself the savings you can realize from using Briney Precision Boring Heads

BRINEY MANUFACTURING CO.

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PONTIAC, MICHIGAN

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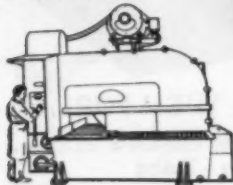
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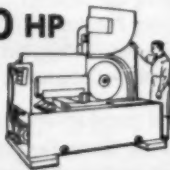
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One Piece Construction New Coolant System

These revolutionary new friction saws are one-piece construction . . . need no expensive pits . . . can be moved quickly and cheaply. New coolant system keeps cut hot, blade cool . . . electronic pressure feed eliminates complicated hydraulic system . . . varies pressure as blade moves through different thicknesses. Steel safety shroud reduces noise level . . . stops flying sparks.

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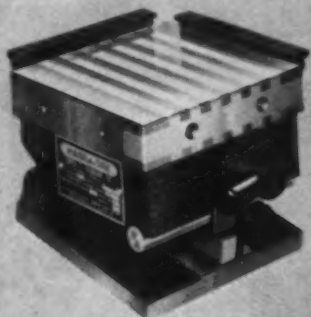
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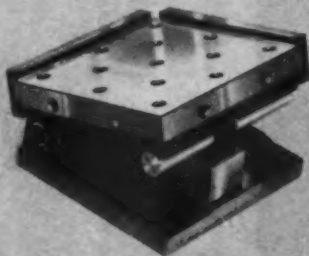
61

NEW SMALL SIZE

**LOWER COST,
FASTER ACCURATE ANGULAR
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Magna-Sine (Model B-3-MS)
With 4" x 4" Working Area



Sine Plate (Model B-3-SP)
With 4" x 4" Working Area

ROBBINS MAGNA-SINE

This new smaller Magna-Sine has all the time-saving, accurate angular set-up features found in larger Robbins Magna-Sines. Small to medium size work can now be set up in minutes instead of hours and with a lower investment in equipment. Magna-Sine table has a strong, fine pole, permanent magnet chuck that firmly holds small work without distortion.

ROBBINS SINE PLATE

Robbins small Sine Plate is manufactured to the same high standards of accuracy as the Magna-Sine. This precision makes it ideally suited for angular inspection set-ups. The ground surface of the non-magnetic table has tapped holes for convenient clamping of any work. Also, sturdy construction makes this small Sine Plate extremely suitable for light machining operations.

Compound angles are quickly and easily set up with this Robbins equipment by combining either two Magna-Sines, a Magna-Sine with a Sine Plate, or two Sine Plates. Now, with lower initial investment, every shop can secure accurate angular set-ups for small work. With Robbins equipment, you do a better job, faster and at less cost.

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THE SHARP EDGES of the chisel-cut high speed rotary file shown here are formed by impact before hardening.

Nicholson File Company relies on the Sentry Diamond Block Atmosphere to retain these critical edges on their endless variety of quality, high speed rotary tools.

In the neutral Sentry atmosphere, automatically generated within the furnace chamber, intricate high speed or high carbon high chrome tools may be soaked for true "file" hardness without danger of surface spoilage.

*Section of high speed
tool at 500X*

*A demonstration of hardening on your own tools will
convince you of Sentry benefits. Why not send us samples?*

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63

THE U. S. TREASURY SALUTES THE PEOPLE IN THE STEEL INDUSTRY



—who buy Savings Bonds and strengthen America's Peace Power

Men and women who earn their living in the steel industry can take great pride in knowing that their crafts and skills contribute, through raw material supplies, to nearly every other great industry in the United States. They can also be proud of the help thousands upon thousands of them are giving to America's Peace Power through the purchase of U.S. Savings Bonds.

If your company has not put in a Payroll Savings Plan, thus far, you can start immediately. Just telephone your State Savings Bonds Director and accept the help he wants to give you. Or write to Savings Bonds Division, U. S. Treasury Department, Washington, D. C.



J. K. THOMSON is shown here at his work in one of the great steel mills of this country. Like thousands of his fellow craftsmen, Mr. Thomson is making regular use of his company Payroll Savings Plan to contribute to the Peace Power of his country.



THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY THANKS, FOR THEIR PATRIOTIC DONATION, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

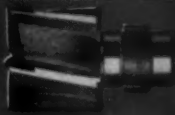
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Wheaton, Illinois

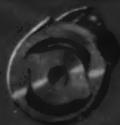
6 Features that make a big difference in counterboring operations!



1. HAND DETACHABLE . . . a notch at the wrist engages or releases the cutter.



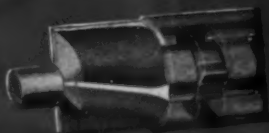
4. BALANCED DRIVE . . . double legs on the cutter engage double abutments in the holder to form a single, rugged tool.



2. RIGHT OR LEFT HAND . . . lock or release either right or left-hand cutters quickly, easily, simply.



5. FREE FROM OBSTRUCTIONS . . . slips easily into a bushing or can be threaded for stop nuts or collars or fitted to remove chips.



3. EXTRA TORSIONAL RIGIDITY . . . drive legs are close to sealing shoulder of cutter for powerful, smooth operation.



6. PRACTICALLY INDESTRUCTIBLE . . . no bending, no shearing—driving forces apply compression.



These are the features that make the difference in counterbores—six reasons why no one has ever reported failure of a Continental Counterbore Drive!



Continental

TOOL WORKS

Division of Ex-Cell-O Corp.

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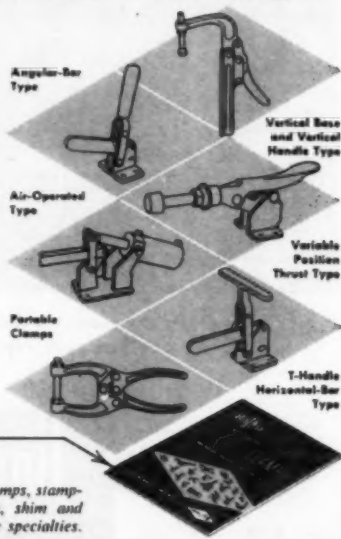


Where It's Quality, Quality, Quality! It's Quality DE-STA-CO Toggle Clamps

FINAL INSPECTION OF ROSS OPERATING VALVES subjects every valve to a pressure test far exceeding its normal usage. For over fifteen years, fixtures similar to this, all employing De-Sta-Co No. 620 plunger clamps, have been built to do this critical high pressure sealing job.

Whether your holding and clamping operation is inspection, machining, tapping, grinding, welding, bonding or other assembly, there is a specific De-Sta-Co Toggle Clamp to do it better. Fast action, positive clamping, long life through thousands of production operations have made De-Sta-Co known for almost 30 years as the leading tool in the field. And all of our medium and larger models use hardened serrated pins in hardened bushings staked to prevent wear. A broad selection of spindle accessories increases the versatility of the clamp you specify.

Our representative in your area is qualified and ready to serve you. Send for our catalog showing clamp applications, scale drawings and complete information.



De-Sta-Co is widely known for toggle clamps, stampings, precision washers, spacers, shims, shim and feeler stock, blower housings and marine specialties.

DIVISION OF
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CLAMPING

DETROIT STAMPING COMPANY

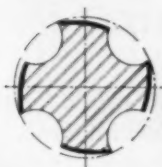
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DETROIT 3, MICHIGAN

Are you SHARPENING them – or GRINDING AWAY their life?

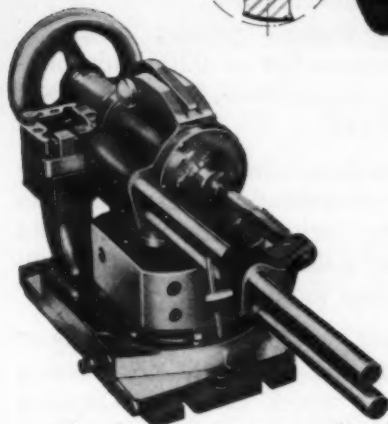
R-O RELIEF

Set-up time 5 minutes.
Grinding time 9 minutes.



ANGULAR RELIEF

Set-up time 10 minutes.
Grinding time 14 minutes.



RADIAL RELIEF



AXIAL RELIEF



ANY COMBINATION

The savings in set-up and grinding time for one tool shown above, may seem insignificant but extend it for a volume run. Add these other R-O advantages: (1) More cuts per grind (2) More grinds per tool (3) Better, cleaner cuts (4) Elimination of operations (5) Reduced inspection (6) Reduced scrap.

R-O savings are important—Thousands of users across the country will attest to this.

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Gay-Lee Carbide "Thinsaws" maintain positive alignment for full-depth cutting without run-out. "Thinsaw" thickness as low as .030" with tolerance held to .0001". Sizes from 1 1/4" to 10" O.D.

Patented carbide tip design and circular seat mounting assure maximum brazing area, positive seating and greater holding strength — tips will not break loose.

For fast, precision sawing, slitting or slotting of cast-iron, non-ferrous, plastics, wood, etc., use Gay-Lee Carbide "Thinsaws". Any tooth form available. For application recommendations, send details of your problem.

Patented—Manufactured under license.

**Note patented Gay-Lee carbide tip mounting. Circular seat assures maximum brazing area and holding strength.*

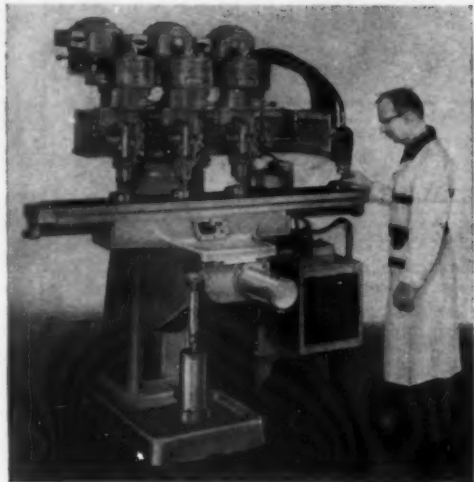
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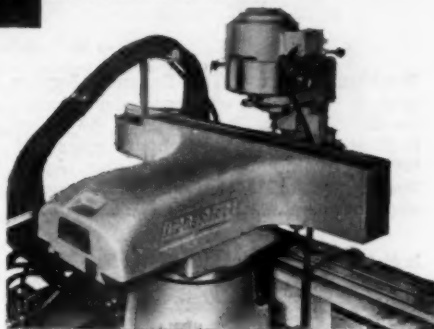
(Left) 3D T-Ram machine with 3 milling attachments. Also available with 2 attachments. (Below) T-Ram applied to 3D Duplicating machine greatly increases its capacity.

This recent development converts the BRIDGEPORT MILLER into a duplicating machine unexcelled for accuracy, speed and ease of operation. It is designed integral with the basic machine and provides simultaneous, multiple-piece production in a single operation. Identified as the BRIDGEPORT T-Ram Tracing Machine, it is available in three models as follows:

1D . . . 180° with vertical 4" feed hydraulic piston movement of knee.

2D . . . 360° with cross and longitudinal feed. Table longitudinal movement 28"; saddle transverse movement 12".

3D . . . with vertical, cross and longitudinal feed. Hydraulic movements: Knee 4"; Table 28"; Saddle 12".



Ways on all models are chrome plated for maintained accuracy, smooth operation and minimum wear. A one-shot lubricating system is provided. The inherent sensitivity and accuracy of the 3D machine is achieved by combining good design with proper application of the universally-accepted True-Trace 3D valve.

Ask for more complete details from us or from your nearest dealer.

***Bridgeport* MACHINES, INC.**
Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

Creative Engineering in Production of Automobiles83

Discussed here in an 18-page article by Wm. F. Schleicher are a few of the highly mechanized operations at General Motors' Opel Works in Ruesselsheim, West Germany. These include the turning, drilling and boring of brake drums on a pallet type transfer machine, the automatic valve line, the broaching and drilling of shifter rods, the propellor shaft fork and yoke line, the cylinder block line and the grinding of universal cross joints. **Page 83**

Washington News. The Revenue Service now is allowing additional depreciation for machines working overtime; the Labor Dept. reports decreases in both hirings and layoffs in manufacturing during April; the outgoing FTC chairman tells how to stop inflation**Page 77**

Individual vs Group Incentives. The fairest and best results from an individual incentive plan accrue only after a careful work measurement program has been installed. Operator grievances are usually reduced when a group incentive plan is substituted for an individual incentive plan. However, the choice of a plan depends on a number of factors and H. R. Nissley presents five questions to guide you in your choice of a plan. **Page 102.**

I.D. Cold Forming. Complex I.D. profiles are produced in cylindrical workpieces by an Intraform machine. A mandrel is inserted in the work prior to its being squeezed by 4 forming dies which pulsate rapidly while revolving around the workpiece. The profile of the mandrel is reproduced in the I.D. of the part. **Page 109**

Re-Usable Die Sections. Here is a new method of die construction. It involves a

standardized series of "mechanical" 2-piece section designed to replace solid tool steel section. Features include: lower initial die investment cost, less production downtime and a high re-usability value. **Page 112**

Instrument Inspection. A completely visible record system for control of 2,000 precision instruments which must be inspected at weekly, monthly or less frequent intervals has been installed at the Richmond Machining Plant of Kaiser Aircraft & Electronics Division. **Page 114**

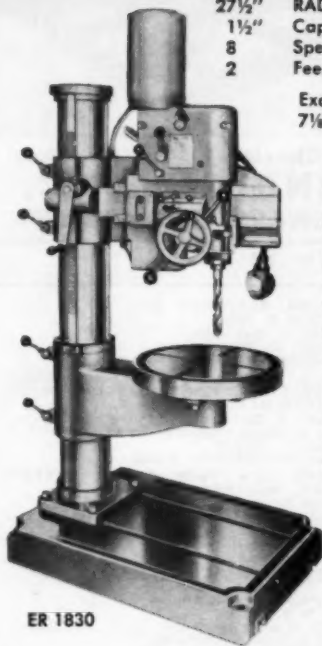
Welding Steel Hubs. No preheating is required to weld high carbon steel hubs to low carbon stampings at Borg-Warner. Welding is done in a Progressive indexing machine equipped with a Lincoln Electric submerged arc head. **Page 119**

Grinding Typewriter Carriage Racks. Two custom-designed 6-head abrasive belt grinders enable an I.B.M. plant to grind four sides of typewriter carriage racks and deburr milled slots on opposite sides of the rack all in a single automatic sequence. The machines utilize four grinding heads mounted in vertical and horizontal sequence, followed by two wire brush heads. **Page 123**

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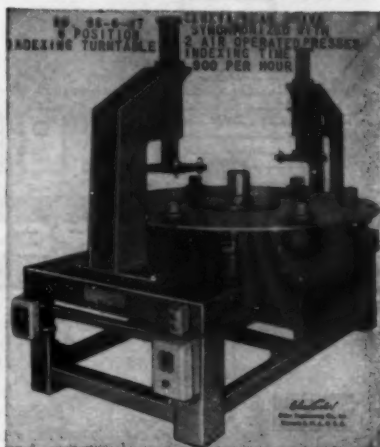
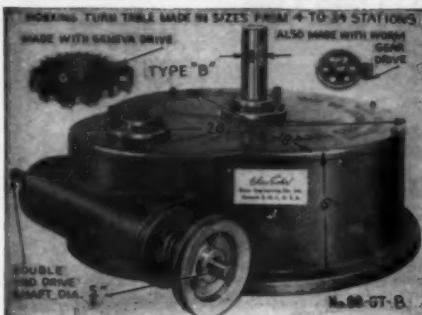
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224	249	274	299	324	349	374	399	424	449	474	499	524	549	574	599
225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600

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I would like to keep a file of these articles for future reference. I would appreciate copies of the entire series.

R. H. BANNISTER
Production Control Supervisor
The Electric Materials Co.
North East, Pa.

Open Die Sets

Will you kindly mail us three reprints entitled "Economical Production of Short Run Parts" as appears in your monthly magazine of November, 1958?

M. G. HIMMEL
Purchasing Agent
Weksler Instruments
Corporation
Freeport, L.I., N. Y.

Mist Cooling

I would like to receive tear sheets of the article "Mist Cooling Up-To-Date," Pages 105 to 109 inclusive in the April, 1959 issue.

W. H. ARMSTRONG
Associate Prof.
West Virginia University
Morgantown, West Virginia

We are interested in the article on

"Mist Cooling Up-To-Date" in the April, 1959 issue. Will you please send us 10 reprints at your earliest convenience?

H. D. PETERSON
Tool Supply Company
Minneapolis 14, Minn.

Cut-Off Wheels

We would appreciate your sending to us four copies of the article "How To Use Abrasive Cut-Off Wheels Most Efficiently," which appears in the May and June issues.

OWEN E. GIBSON
Pelham Machinery Co.
Dumont, New Jersey

Precision Holding

I am very interested in an article in the January, 1959 issue of MACHINE and TOOL BLUE BOOK on Page 115, titled, "Precision Holding".

Our problem here is who is the manufacturer?

Your attention to this request will be appreciated.

E. J. PETERSON
TOOL DESIGN SUPERVISOR
GARDNER-DENVER COMPANY
Denver, Colorado

The distributor for the Ringspann discs is Karl Neise, 404 Fourth Ave., New York 16, N.Y.

Meetings

Aug. 10-13—Society of Automotive Engineers, National West Coast Meeting, Hotel Georgia, Vancouver, B.C. Headquarters: 458 Lexington Avenue, New York 17, New York.

Sept. 10, 11—The Society of the Plastics Industry, Inc., Midwest Section Conference, French Lick Sheraton Hotel, French Lick, Indiana. Headquarters: 250 Park Avenue, New York 17, New York.

Oct. 12-14—National Electronics Conference, Hotel Sherman, Chicago. Headquarters: 228 LaSalle St., Chicago 1, Ill. Contact: Hal Bergen, 185 N. Wabash Ave., Chicago 1, Illinois.

Nov. 2-6—National Metal Exposition & Congress, American Society for Metals, International Amphitheatre, Chicago, Illinois. Headquarters: 7301 Euclid Avenue, Cleveland 3, Ohio.

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I have talked to businessmen urging that their products be priced just as low as they can make them, and if there were places where they could reduce prices I would be delighted. I do not want to see this so-called wage-price spiral continue until we get to the point that something drastic has to done.

President Eisenhower

Labor Dept. Reports Drop in April Hirings, Layoffs

The Labor Department has reported that in April the hiring rate in manufacturing ended its steady climb, which had continued since last November. On the other hand, layoffs also dropped in April—from 13 to 12 per 1000 workers. Considering both aspects of factory labor turnover during that month, the report "reflected continuing improvement in the nation's job situation," according to the agency.

Plant hiring dropped from 36 per 1000 to 34. All of the decline was in durable goods—from 39 to 37 per 1000. In non-durables, the April rate remained at the March level of 30. The primary metals industry showed the greatest decline in hiring—from 41 per 1000 in March to 31 in April.

Compared with April 1958, at the depth of the recession, hirings have increased by nine per 1000 workers and layoffs have dropped

by 18 per 1000. Voluntary resignations in April 1958 were only seven per 1000, as compared with a rate of 10 to 12 per 1000 for that month this year—indicating, perhaps, greater job availability.

Outgoing FTC Chairman Tells How to Stop Inflation

John W. Gwynne, retiring chief of the Federal Trade Commission, has presented to Congress his personal program of inflation control; (1) power over monopolies, both in business and in labor; (2) reduction in Federal expenditures.

Mr. Gwynne urged the Senate Antitrust subcommittee to fortify antitrust laws and rigidly enforce existing regulations to bring about the competition necessary to keep prices down. "We must insist on diversification and a lack of concentration," he asserted.

Although he does not favor applying antitrust laws to labor in the same way they are used in busi-

What is the solution to inflation? Not wage and price controls. Weakening the competitive principle still further is hardly a remedy for a condition which has weakened it. Government policies should support the competitive principle. Government should seek to insure that the voluntary productive groups increase in number and in effectiveness since they constitute our major instrumentality for national growth.

Roger W. Blough
Chairman, U.S. Steel Corp.

ness, Mr. Gwynne contended that Congress should impose "some control" over concentration of power by unions.

In advocating a cut in Federal expenditures, the FTC chief maintained that deficit financing automatically causes a rise in prices.

Democratic subcommittee members, however, told Mr. Gwynne that his proposals for ending inflation did not cover the problem adequately. Subcommittee Chairman Kefauver (D., Tenn.) contended that those responsible for the principal problem of inflation are management in "concentrated" industries (controlled by a few companies) who price their commodities without regard for market factors.

Sen. John Carroll (D., Colo.) asserted that rising corporate profits should be considered another important cause of higher prices.

"The question of profits is not important; competition is," the FTC chairman replied. He then protested that companies in concen-

trated industries do not have full control of their prices irrespective of market factors.

National Chamber Delegates Approve Policies for Year

At the 47th Annual Meeting of the Chamber of Commerce of the United States, held in Washington recently, plans were laid for a broad range of programs for the coming year. Delegates approved policies recommending:

- A new military procurement law to speed production of new weapons at less cost.

- Continued support of the Reciprocal Trade Agreements Program, with adequate safeguards for U. S. business.

- Continued approval of the Mutual Security Program.

- A broader program of revenues to maintain construction schedules for the Interstate Highway System.

- Better coordination of civilian and military space programs to prevent wasteful overlap.

Extra Depreciation for Machines Working Overtime

Although the Revenue Service checks depreciation deductions very carefully, additional depreciation is allowable for plant machinery being operated overtime or in an unusual manner.

For example, a machine having a normal life span of six years when operated eight hours a day would

be fully depreciated in three years with a 16-hour-day operation. The taxpayer can double his depreciation rate for those periods during which the machine is operating at twice the normal time.

Detailed records must be kept of the unusual operation of the machine, and the taxpayer must have evidence, based upon the findings of an expert mechanic, that his machine is actually wearing out at an accelerated pace.

The farmers have succeeded in getting the country to accept uncritically the notion that they are entitled to have the government support the prices of the goods that they produce—pretty much regardless of whether or not the consumers desire these goods. It would make as much sense for the government to buy millions of tickets to movie theatres to alleviate the effect of the shift in demand from movies to television as to spend money to provide the farmers with markets.

Dr. Sumner H. Slichter, economist



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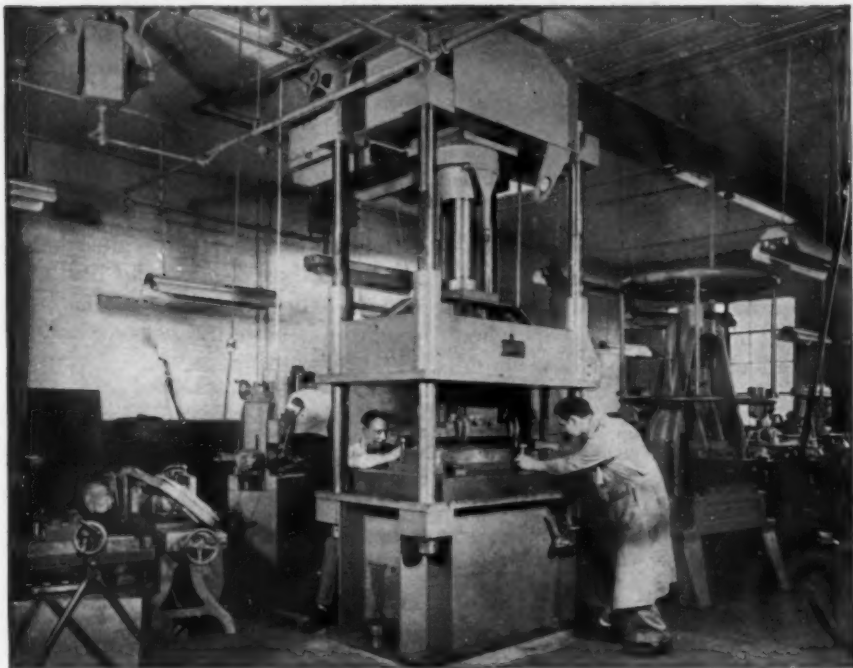
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The diemaker who made a nuisance of himself

This is the story of Three Star Manufacturing Co.—a custom diemaker who serves a number of manufacturing plants in Chicago.

As in most such shops, his only means of trying out dies was a hand power screw press which sometimes needed six or seven men to get the needed pressure.

Large dies had to be tried out on his customers' production presses . . . which required drayage (\$15 to \$20 each way) and interruption of his customers' production. It meant both expense and nuisance to his customers and himself every

time a die had to be tested.

Now he has ended the nuisance by installing the press shown above in his own shop. It not only saves time and money, but avoids the embarrassment of having workers in his customers' plants see and know that occasionally a die must be taken back for adjustment.

Specifications for DAKE single-acting and double-acting die tryout presses in eighteen electrically operated models are contained in Bulletin 330. Write today for your copy!

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More Reasons to Do a More Economical Job

The fact that U.S. industrial output is again reaching new peaks, after a recession that was much worse than Europe's, may be the harbinger of a return to the complacent feeling that present production equipment and methods are good enough. But there are danger signals out: U.S. exports, which fell sharply during the recession, have failed to pick up while imports remain at high levels. In March, Great Britain exported more goods to us than she imported from us. This is the first time in almost a hundred years that this has happened.

This is somewhat of an embarrassing situation since, by British Industrial leaders' own admission, much of their industrial plant facilities need replacement. It will be interesting to see what happens if their Industry takes advantage of their Chancellor's liberalized depreciation allowance for procuring available improved machines and equipment.

If Britain is at somewhat of a crossroads in their manufacturing history, so is the U.S.! American production and methods have been the model for the world so long that complacency is a natural offspring. We only have to look at a report and description of the production lines in some other countries to see that there are outstanding examples of machining and tooling practice outside our borders,

too. (See "Creative Engineering in the Production of Automobiles" on the following page.)

Today we enjoy a 3-to-1 advantage ratio in our balance of trade with Japan. Her orders for farm equipment in Illinois alone keep several thousand of our people working. But Japan is making such great strides in other branches of industry—notably optical equipment and small electrical products—one wonders how long this 3-to-1 ratio will hold out.

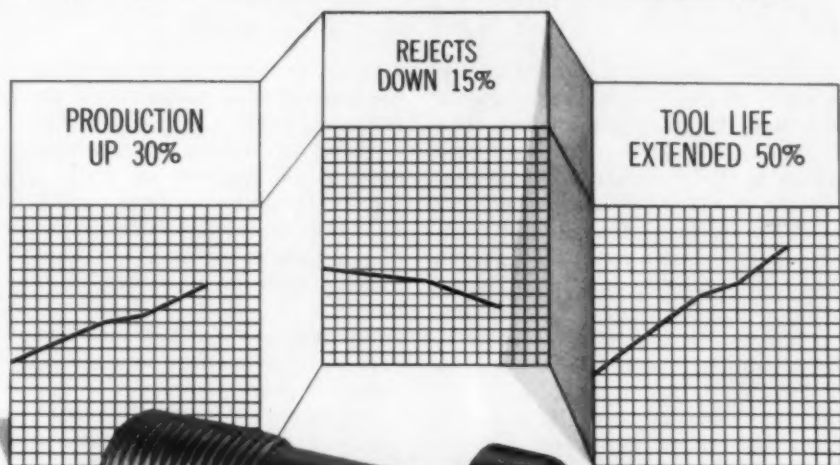
In the past, U.S. Industry has matched output to the ever increasing cost of labor and still maintained a favorable balance of trade with foreign countries. But a glance at the figures of exports to principal countries for the past 10 years brings one conclusion: sooner or later U.S. Industry must find its way again in international trade.

Improved equipment is available; more is on the way. To be in the competitive picture in the Sixties, more and more manufacturers will be facing the fact that the general level of production per man-hour must approach the efficiencies already achieved in those industries where competition has compelled them to streamline their production facilities.

PAUL A. MELINE
Managing Editor

Value analysis boosts production 30%

This was the outstanding result when a metalworking company studied and evaluated production of piston pin bolt heads with a Ryerson representative. The Ryerson specialist recommended Rycut® 40—the world's fastest machining alloy steel in its carbon range.



Other cost-cutting results:

In addition to boosting production, this risk-proof Ryerson alloy reduced rejects 15% . . . increased tool life 50% . . . and gave parts a better finish. Ryerson value analysis of materials and methods may help solve some tough problems for you. Contact your nearby Ryerson plant for details.



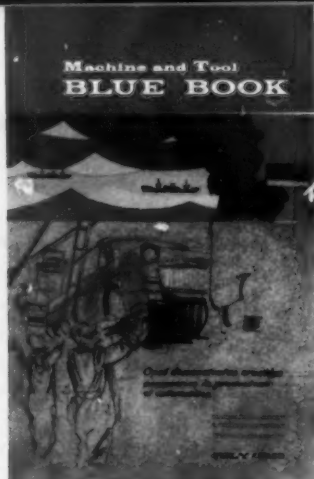
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GENERAL MOTORS' OPEL . . .



Creative Engineering in Production of Automobiles

A look at a few of the many highly mechanized lines

By **William F. Schleicher**
Vice President, Editorial Director
Hitchcock Publishing Co.

● Several years ago we discussed some of the manufacturing facilities at the Volkswagen Works, in Wolfsburg, W. Germany.* There was little of advanced mechanization to be found at the Wolfsburg plant, although we hasten to add that this lack in no way affected quality. In the present article we will discuss merely a few of the highly mechanized operations at General Motors' Opel Works in Ruesselsheim, W. Germany. There is no comparison between the two plants. The

V.W. plant is almost entirely in-line production; the Opel plant is almost completely mechanized. While the purpose of this discussion is not aimed at comparing the two plants, it is mentioned to dispel the impression some readers may have gained that all West Germany production plants are years behind our advancements. The present, all too brief, description of the Opel Works should correct any such impression.

As a matter of historical interest, it should be noted that the Opel management—before the acquisition of the facility by General Motors—recognized the advantages of mass production and installed, in 1924, assembly-line production.

*Machine and Tool Blue Book, May, 1957.

GENERAL MOTORS' OPEL continued

European mass production industries are making use of advanced mechanization. Their own machine tool industry, once weak in special machines, is gaining strength, and at Opel we found skilfully constructed special machines. Much of the planning was under the direction of three or four American-trained production executives who worked with the German machine tool builders in the design of the automated lines.

Many American machine tools were in use at the plant, having been selected on a basis of their superiority over European tools.

The Opel enterprise was launched in 1862 by Adam Opel, who produced sewing machines in a cow stable. By 1886 Opel employed 300 men and had produced 18,000 sewing machines. In 1887 they also entered the bicycle market. Opel, in subsequent years, was to become the world's largest manufacturer of bicycles. In 1898 the first Opel automobile was produced. In subsequent years, it became increasingly popular. By 1928 the Opel factory had become the largest in Europe, with an annual output of 42,771 cars and a payroll of 7,600.

In 1928 the Opel Works was acquired by General Motors, and in 1931 became a wholly-owned G-M property. With new ideas, new equipment and model changes,

Opel strengthened its position further, so much so that in 1932, the worst year of the world's depression, 21,000 units were produced. By 1935, Opel was producing 102,000 units and also surprised the automotive world with its new 1.3-litre Olympia car, the first all-steel car of integral-type construction on an assembly line basis, the first car of this type ever produced.

Heavy destruction was caused during World War II. After the war the U. S. Army took over the plant and pressed rebuilding, with production beginning during 1947 and 1948. In the meantime, tools and dies for the manufacture of the smallest Opel, the Kadett, had been turned over to the Russians and carried out of Germany.

Over the years automated lines have been installed and the best production thinking of W. Germany and the U. S. have been combined to make Opel one of the most modern facilities in the world.

Today, Opel employs 33,000 people. In 1958 it produced 315,945 vehicles, of which 167,237 were exported.

Space permits us to show only a few lines and a few general photos. It is unfortunate that time prevented us from discussing their new body plant, which was placed in operation in 1956. However, it is hoped that from these brief pages, BLUE BOOK readers may gain an appreciation of G-M's Opel plant.



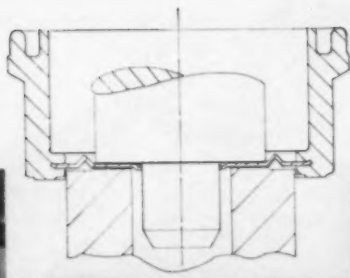
Model of General Motors' Opel Works in Ruesselsheim, West Germany.



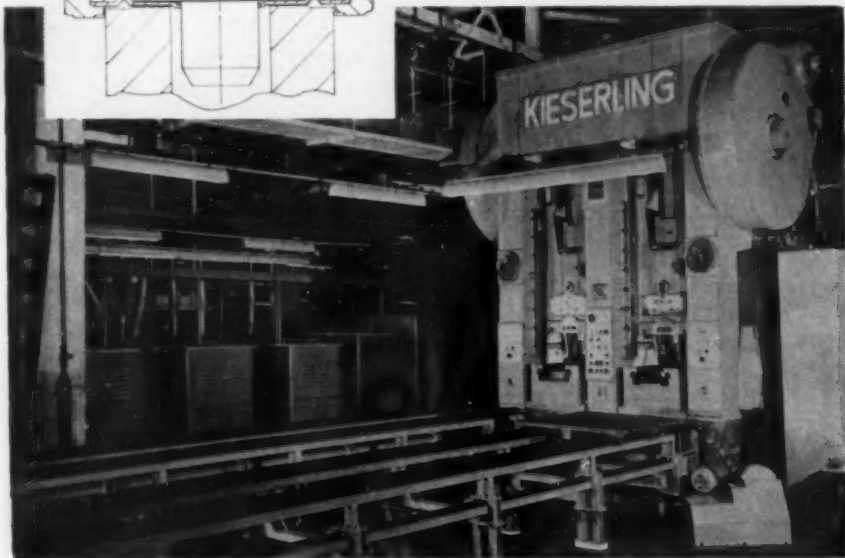
Central planning office. Production engineering section is at left.

1. Turning, Drilling and Boring

A. Coining operation on a 300-ton press.



1. Coining press. A storage tower to the right has a capacity of 1500 brake drums.



The first operation is performed on a coining press, Fig. 1 and Fig. A. A storage tower is located on the right which accommodates 1,500 brake drums. This press operation is not an integral part of the transfer line.

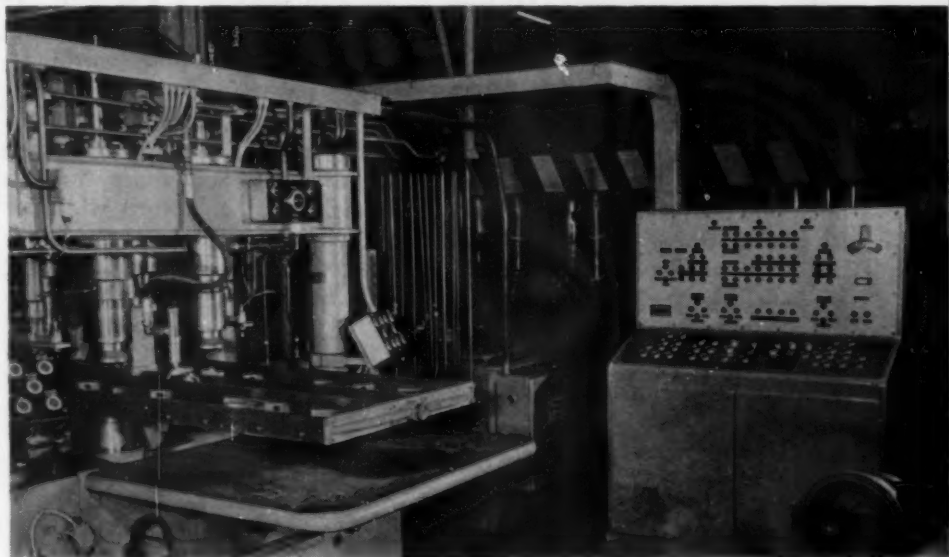
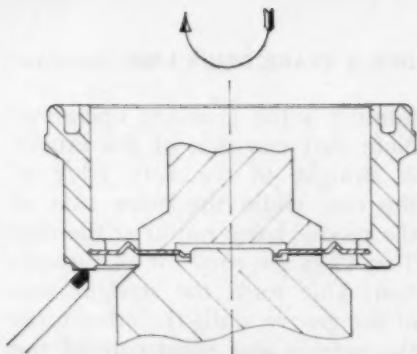
From the coining press the drums go to a four spindle turning machine where locating pads are machined. Four drums have locating

pads machined simultaneously, three small and one large drum, Fig. 2 and Fig. B. In Fig. B note how the drums are held in position during the turning operation by means of a vertical hold-down fixture. From the turning operation the drums are sent by conveyor to the loading station on the transfer machine. This can be seen in Fig. 3. The loading station handles

Brake Drums

B. Turning locating pads on brake drums prior to their entering the transfer line.

2. This 4-spindle machine turns the locating pads on the brake drums.



four parts at a time (in the left of the photo), while the parts from the locating pad turning operation are shown on the conveyor in front of the loading station. At the far right and again near the left center of the photo can be seen the triangularly shaped pallets.

Once loaded on triangular pallets the drums proceed automatically through the transfer line. At station

No. 3 a facing operation takes place, Fig C. Note that the drum is held in position on locating pads C and on the outside of the drum at points A and B.

At station No. 4 the drum is turned and chamfered on the O. D. and a groove is turned in the top of the rim. A turning head is used in this operation, Fig. D, and all tools are located on this head. Of

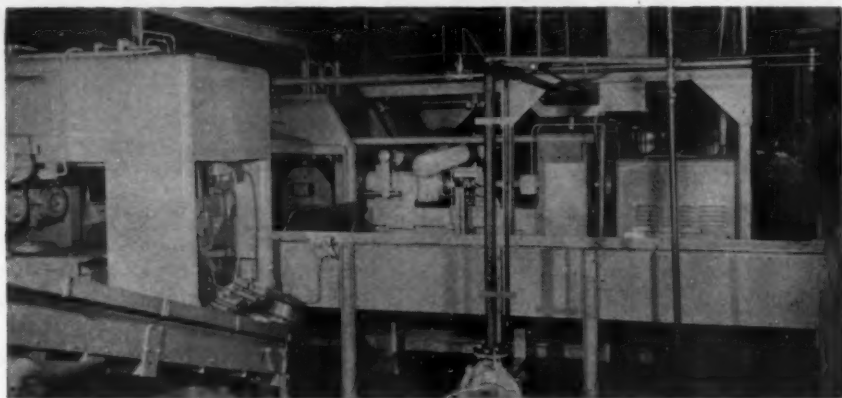
interest is the grooving operation. Note that one side of the groove is straight to the very edge of the rim, while the other side of the groove has a radius at the rim. Two tools are used for this operation: One turns the straight side of the groove while the other turns the outside and takes care of the radius at the same time. All tools on this operation are carbide.

At station No. 5 the I. D. of the drum is rough bored, Fig. E.

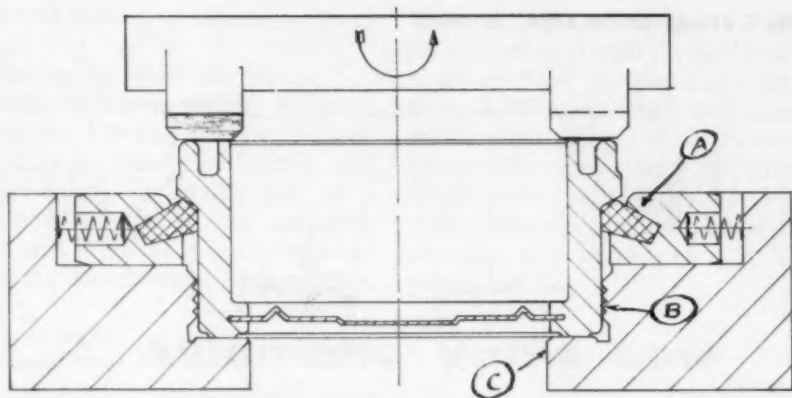
At station No. 6 a total of six holes are drilled as well as boring the main hole, Fig. F. The boring operation consists of rough and finish boring. Rough boring is accomplished by tool A and finish boring by tool B. Step drills are used for the drilling operations. Rough and finish drilling is done here. Because

the material is thin, out of roundness would result if other drills were used. A total of four large holes and two small holes are drilled at this station. All drills are located on one head. Drills are high speed steel.

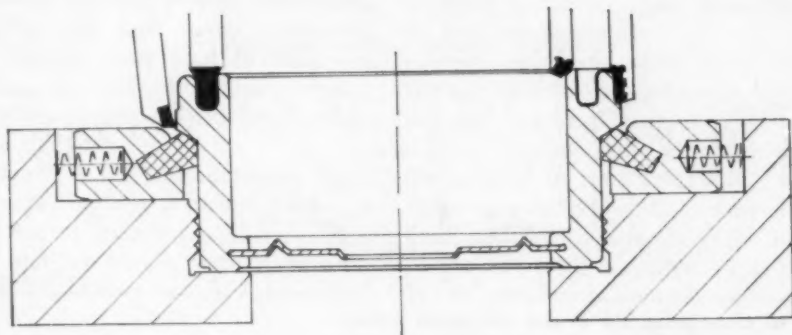
Chamfering drilled and bored holes takes place on station No. 7. The tool used is a Cogsdrell. As the drill advances the chamfering cut is made; as the downward pressure of the tool continues the cutting bit which is attached to a spring inside of the drill is pushed into the drill and slides through the hole. On the return stroke of the drill the top side of the bit is engaged for the bottom chamfering cut. Once again, as the drill is retracted, the bit is pushed into the drill and is withdrawn. Thus both



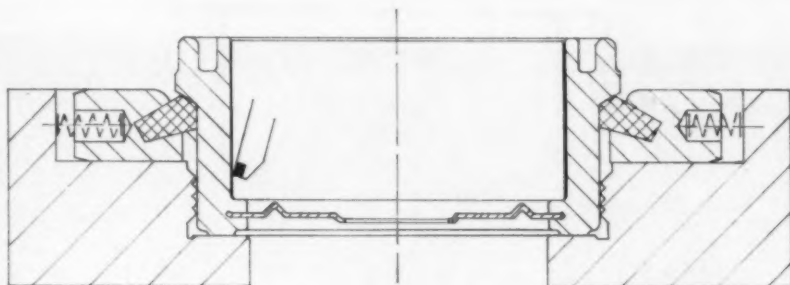
3. The brake drum transfer machine showing the loading station which accommodates four parts. The feeder conveyor from the 4-spindle turning machine can be seen feeding to the loading station. The pallets which carry the brake drums through the line can be seen as the triangularly shaped pieces at the far right and left center.



C. Facing operation. Note method of holding the drums during this and subsequent operations at points A, B and C.

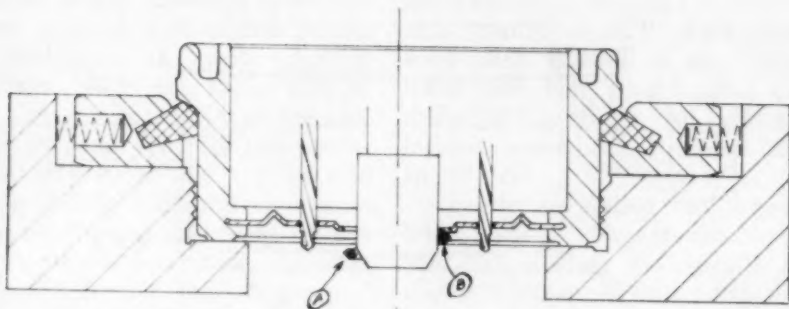


D. Turning, chamfering on the O.D. and turning groove in the top of the rim.

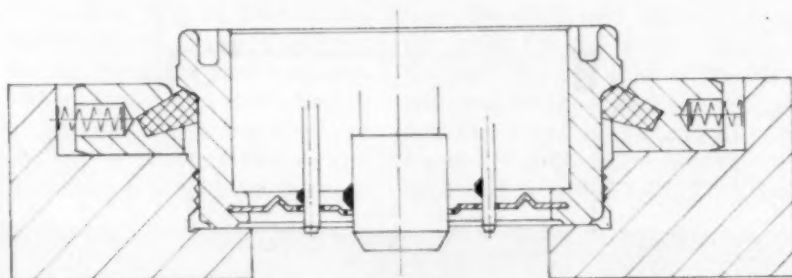


E. Rough boring the I.D.

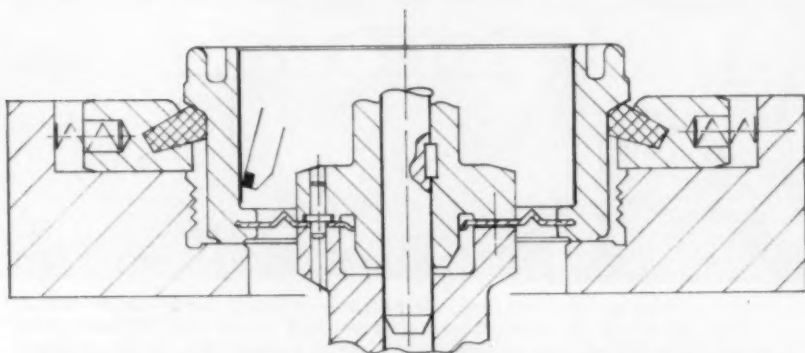
OPEL'S BRAKE DRUM LINE continued



F. Drilling six holes and rough and finish boring the main hole. With step drills, rough and finish drilling is done here.



G. Chamfering the drilled and bored holes.



H. Finish boring is accomplished at this station—to 12 microinches. Part is clamped as in the final car assembly.

top and bottom of holes are chamfered, Fig. G.

Station No. 8 is idle. Station No. 9 is a finish boring station. A change takes place in the holding method. Holding is from the bottom and attached to the pallet and is a duplication of final car assembly. It is only after the drum is centered that the actual holding takes place.

Two stations are needed for the finish boring operation because it is slower than the previous operations. A 100 micro finish is obtained on these boring operations. Because the specifications call for a 60 micro finish, honing is required.

One operator is employed on the machine and production is 270 pieces per hour.

2. Automatic Valve Line

The Valve Line is an efficient installation and is almost entirely automatic. Opel process engineers, during our visit, were designing additional equipment to keep up with increased production requirements and also to further mechanize the lines.

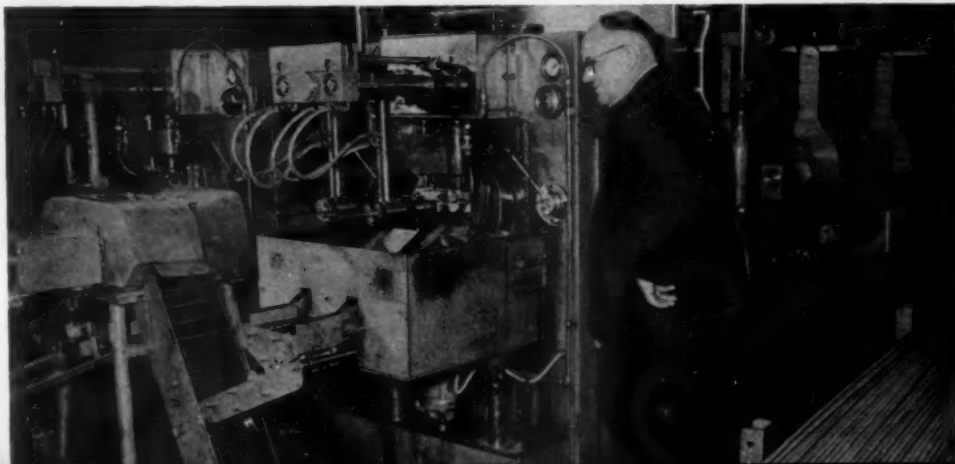
Stock is fed automatically from a magazine to two special 2-spindle automatic machines where stems are cut to length with a turning tool. There they are also chamfered

on both ends, Fig. 4. They are ejected into a chute leading to the washing machines; from there they go to a storage unit.

Two conveyors lead from the storage unit to the resistance heating and heading machines.

Two heating units and one die are located in each machine. Two stems are loaded into a carrying head which moves to the right and to the left from a center. (Fig. I) While one stem is being heated and

4. Beginning of the mechanized valve stem line. Stems are cut to length and chamfered on both ends on two 2-spindle special cut off machines.

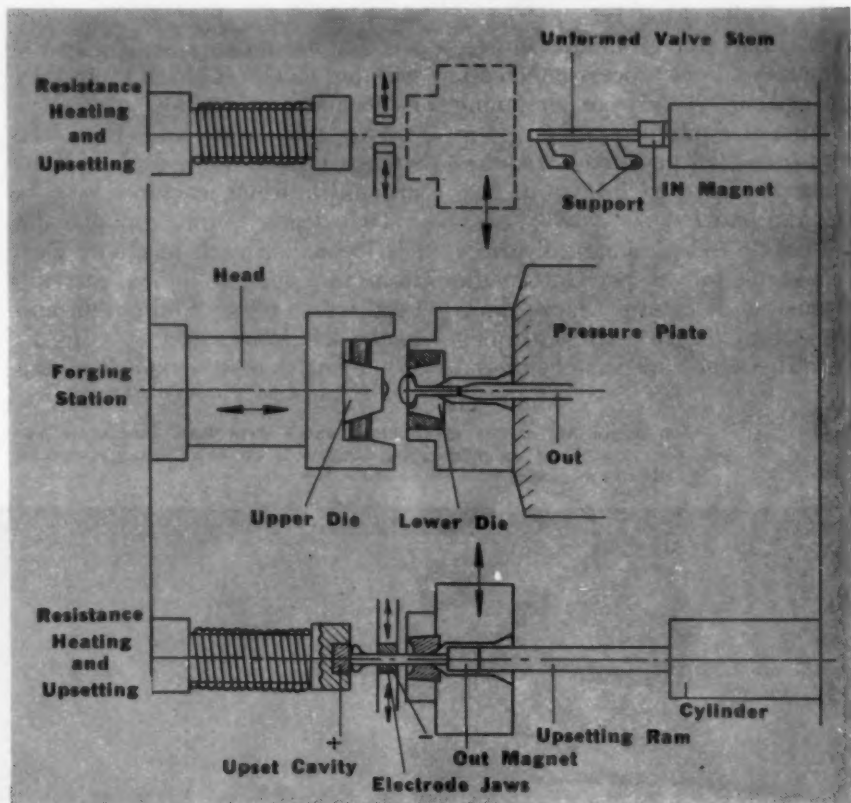


OPEL'S VALVE LINE continued

metal gathered, the other is being headed. After heading, the part drops out and a new stem is inserted; the head then moves to the left and a new stem is heated. While the head moves with the new stem the other stem, which has been heating, is moved into heading position. The machine is shown in Fig. 5. Loading and un-

loading is automatic. The valves next go to a disc grinder where they are ground to lengths. Grinding is done on one end.

The grinding fixture is of the drum type with stems falling automatically into place. Locking is done by a cam arrangement which opens to release a ground valve and then admits a new one. A small

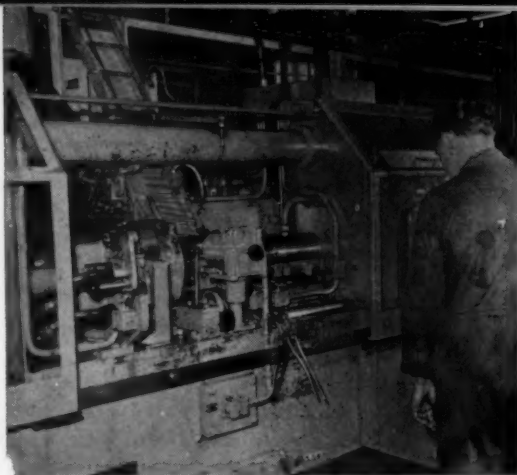


1. Heating and heading valve stems.

roller, by which the parts must pass, makes certain the part is properly positioned.

From the disc grinder the stems are moved to a centerless where the stems are ground by the throughfeed method. The regulating wheel is flattened slightly on one side. As the stems are finished the flattened side of the regulating wheels breaks contact with the workpiece which is then pushed out of the grinder by the stem following it.

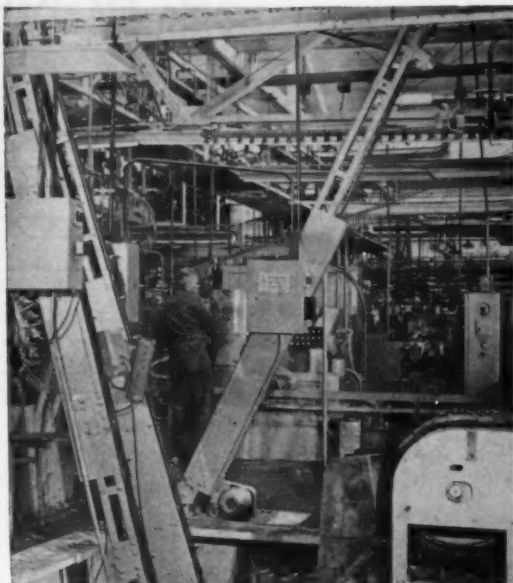
After centerless grinding exhaust valves have the valve seat turned



5. Resistance heating and heading operation. Loading by chute and unloading are automatic. (One machine for intake valves and one for exhaust valves)



6. Welding nickel onto the previously turned exhaust valve seat. Overhead conveyor supplies five welding machine parts. Only three are shown.



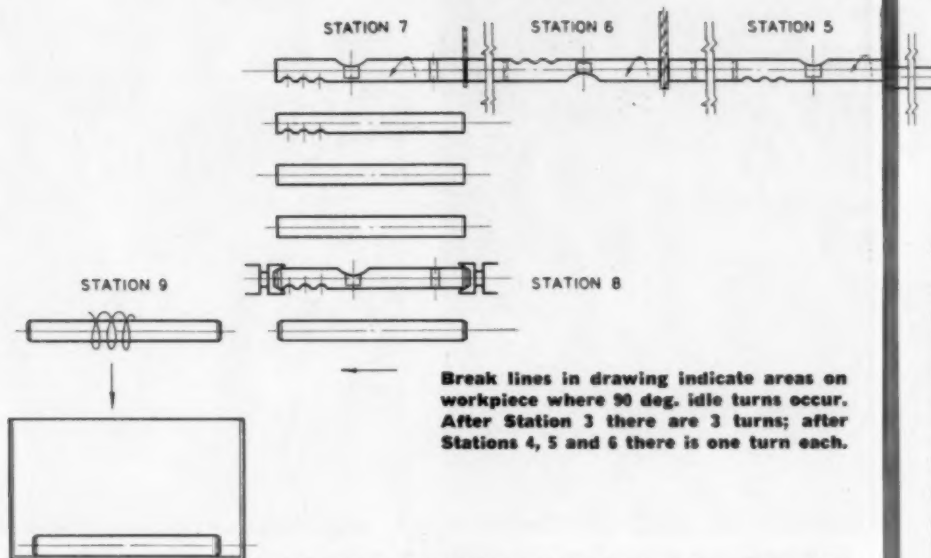
7. Valves from the annealing operation are then moved by elevators, conveyors and chutes to subsequent operations.

on a three-spindle machine. Loading is again automatic from 3 chutes to 3 heads. The tools are on a horizontal slide. From here parts go by chute to the welding machines, Fig. 6.

Note, in Fig. 6, that the overhead conveyor supplies the five welding machines. Nickel is welded onto the previously turned valve seats. The nickel wire is on spools located above each machine. After the nickel has been deposited the

valves fall out of the rear of the machine to an induction heating and restrike operation. Then thru annealing operation. From here, chutes, elevators, and conveyors take the parts to a three-station machine for turning the valve seat. Two stations on the machine are work stations while the third is for loading and unloading. A good view of the elevator and conveyor can be seen in Fig. 7. This photo shows the parts coming out of the

3. Broaching and Drilling



J. Highly mechanized shifting rod line features broaching, drilling, reaming, cut-off, facing and case hardening. Stock measures 18 ft. in length and is fed into machine in the same manner as for an automatic bar machine.

annealing furnace and being deposited into feeder drums preparatory to their ascent and subsequent delivery to other machining operations.

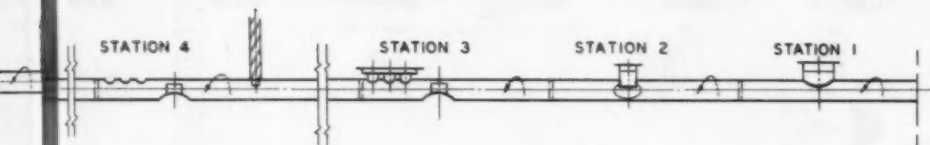
After chamfering, valves are delivered to a grooving machine where a groove is turned near the end of the valve stem and a chamfer is put on the end. This is done on a rotary 6-station machine. Machining is done under the table. At the unloading station the finished valve is pushed through the table and a fork, above the table, lifts the valve out and carries it

away. Then, by chute, the parts go to induction hardening of the stem end.

The valves run on a continuous chain to the induction heating element, stop briefly for heating and are then quenched in oil.

After heating and washing the valves are conveyed to centerless grinders, disc grinders and a valve seat grinder. The final machining operation in this automatic valve line is a centerless grinding operation. The valves then are automatically conveyed and placed on a special inspection conveyor.

9 Shifting Rods



One of the fascinating and ingenious lines which attracted our attention was the shifting rod line. This is a highly mechanized broaching and drilling line in which the operations are performed on 18 ft. long pieces of stock. The stock makes 90° turns as it advances through the line. The drawing in Fig. J illustrates the operation. The machine, which is a 9-station machine, performs the following operation at almost 100% efficiency: broach, drill ream, cut-off, face, harden.

To make the project even more interesting four different parts are

made: two short, two long, and a right and a left of each. This requires a tricky arrangement of turning the stock as it passes through the machine and is the reason for the idle turns after stations No. 3, No. 4, No. 5 and No. 6. Because of the two different lengths of the refinished parts, each station has two sets of tools to accommodate the long and short parts; however, the operation is the same for both sizes.

The material, 18 ft. long round bar stock, is pushed into the machine in the same manner as for an automatic bar machine. At sta-

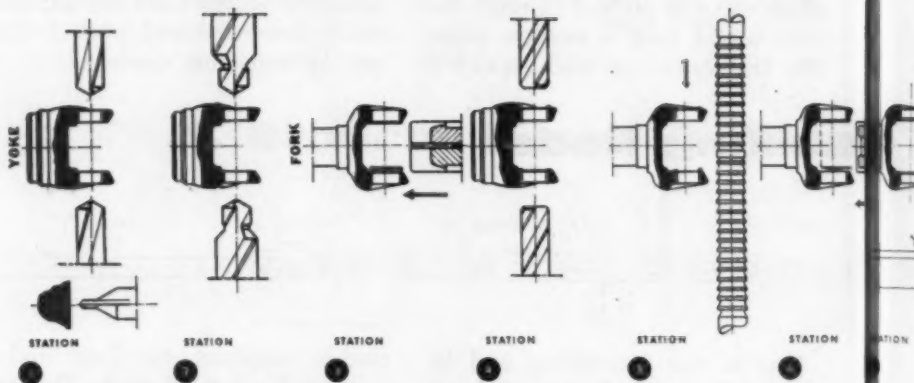
SHIFTER ROD LINE continued

tion No. 1 the first broaching operation takes place, a relief.

The entire length of 18 ft. material now turns 90° and a keyway is broached at station No. 2. At station No. 3 three curved grooves are broached.

Three idle stations follow station No. 3. However, while the 18 ft. bar turns at the three idle stations, stations 1, 2 and 3 are operating on the other segments of the bar. At station No. 4 a step drill drills a $\frac{1}{8}$ " hole, then an idle sta-

4. Propellor Shaft Fork and Yoke



The illustration above depicts the propellor shaft fork and yoke line. On the opposite page is a view of the line. Only one operator attends to the loading and the operation of the machine. Three yokes and one fork are placed into the holding fixture and processed as follows:

Station No. 1: rough drill one fork and rough drill and center three yokes.

Station No. 2: bore one fork, bore and chamfer three yokes.

Station No. 3: rough mill one fork for broaching.

Station No. 4: bore one fork and three yokes to broaching diameter.

Station No. 5: broach one fork bore.

Station No. 6: flat broach one fork.

Station No. 7: inside bore one fork, burr and wash; wash 3 yokes.

Station No. 8: gage.

Station No. 9: automatic unloading.

Station No. 10: load.

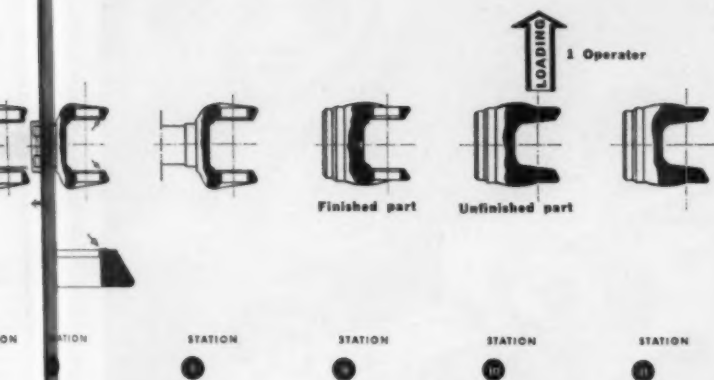
Station No. 11: automatic orientation and clamping. (From here fixture is conveyed to Station 1).

tion again. At station No. 5 the hole, begun at station No. 4, is completed. Two drilling operations are needed because of the short cycling time of the machine. Again an idle station. At station No. 6 the previously drilled hole is reamed. At station No. 7 the part is sawed off.

A walking beam fixture takes the part to a facing operation where both ends are faced and chamfered, then to station No. 9 for an induction heating operation in a few of the machined surfaces.

Production on this installation is 155 completed pieces per hour.

Yoke Line



Close-up of the transfer mechanism with the chip conveyor at left and broaching station in the center.



5. Cylinder Block Line

Broaching, milling, tapping and honing



Broaching. Blocks to be machined are placed on the transfer conveyor of the big broach by means of an air hoist. The work is then turned into working position automatically for broaching three faces by a planer-type broach. Weighing 95 tons, this machine rests on a foundation sunk eight to 10 feet deep into the ground. Production rate: 100 blocks/hour.



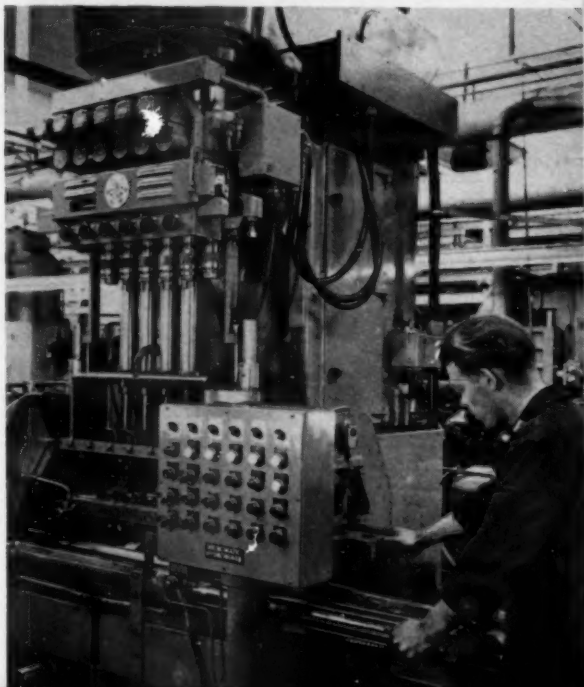
Milling of the cylinder block sides and subsequent drilling of holes is done on a Burchardt & Weber transfer machine, which is started by operation of a push button on the control panel. Tool motions for the individual operations and transfer of the block from station to station are controlled automatically.



Tapping. Fourteen sets of opposed Burr units operating a total of 250 tools for tapping and automatically checking holes are combined to make the largest transfer machine in cylinder block line.

Opel is strong on quality control. This is a phase of their operations of which they are justly proud. Their mechanization, advancing as it has since the war years, has brought their quality to standards which never could have been attained without modern transfer-type machining equipment.

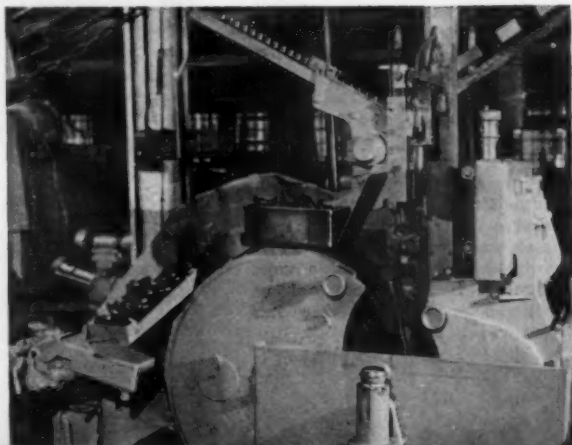
Honing. Both 4- and 6-cylinder blocks are honed on the Micro-matic honing machine, operating on a completely automatic cycle. Each honing tool incorporates five honing stones. Stock removal is automatically controlled by means of a gage ring which collapses tool as soon as preset bore size has been reached.



6. Grinding Universal Cross Joints



Machine battery for multiple-wheel grinding of the universal cross joint with automatic loading equipment.



Loading fixture for grinding two pins at a time on multiple wheel grinder.

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Practical Arbitration, Time Study and Work Simplification—Part VII

Individual or Group Incentive Plans



By **Harold R. Nissley, P.E.**
Consulting Engineer

● An *individual incentive* plan is a wage payment plan that is geared directly to a single worker's effort and/or productivity. *Example:* Ordinary individual piece work such as 1c per unit of output (per operator).

A *group incentive* plan is a financial incentive plan that rewards the joint or combined accomplishments of two or more operators or workers working in the same general area. *Example:* If a standard hour plan has been worked out for a plant maintenance crew and cer-

While it is difficult to generalize on the merits and shortcomings of individual and group incentive plans, certain broad principles may help you decide whether to adopt one or the other under a given set of circumstances. The decision to adopt either, of course, depends on the variables.

tain pay-period standards (allowed hours) have been set up, the maintenance crew might share in all or part of the time savings below the allowed standard hours; thus if there are 10 maintenance men working 400 man-hours during a regular work week and these 10 men complete repair jobs that only took them 300 man-hours (compared with a total of 400 "allowed man-hours"), the group bonus, based on some pre-determined formula, would be distributed (equally in most cases) among each of the 10 maintenance crew members.

Incentives?

Which is Better?

Implication of Individual Incentive Plans

A good individual incentive plan will reward the individual for above-average effort or performance. And this reward will be at least on a one-for-one basis in most instances; that is to say for each 1% increase in physical effort as reflected by increases in output, the operator will receive a 1% increase in his pay. But the fairest and best results from an individual incentive plan accrue only after a careful work measurement program has been installed; such a work measurement program generally measures individual operator effort going into each job or task performed by an operator. And such measurement is time-consuming and frequently costly—unless a management wishes to take some big chances with historical or “hunch” work standards. Moreover, a spirit of cooperation is lacking in many individual incentive plans (“If he can’t do his work, that’s his hard luck; I do my work and that’s all I’m going to do.”).

Implications of a Group Incentive Plan

Because much time is frequently spent in resolving operator time-

study grievances, such operator grievances are usually reduced when a group incentive plan is substituted for an individual incentive plan. Moreover, under a group incentive plan there develops (theoretically, at least) a group *esprit de corps* that gets out production with a minimum amount of fuss and friction; everyone pitches in regardless of whose job it is. Work measurement does not have to be as detailed or refined in group incentive plans as in individual plans. Because of the frequent help one operator gives another in a group incentive plan, sharp delays and bottlenecks are not as frequent during absences and illnesses as occur under an individual incentive plan; under the latter plan, the absence of a highly skilled operator could result in the piling up of work in an entire department or the slowing up of work on a production line to an alarming degree.

Thus it appears that the arguments favor the group incentive plan over the individual incentive plan. But the truth of the matter is that regardless of how many arguments are advanced in favor of one plan over the other, there would be so many exceptions to

Should you install a group incentive plan? Answers to five questions

any final conclusion that an unsophisticated reader could easily be misled. Thus the choice of a group incentive plan (as opposed to an individual incentive plan) will rest, largely, on your answers to the following questions:

1—*Is your present wage payment plan a day-work plan (i.e. non-incentive)?* If your answer is "yes," then you will be in a better position to install a group incentive plan than you would be if your present plan were an individual incentive plan.

2—*Are most of your jobs of a multi-operator variety (e.g. assembly line, heavy lifting and handling, coordinated hold-and-fasten)?* If most of your jobs fall within this framework, then the group incentive plan would lend itself for incentive application.

3—*Are you prepared to spend from 1% to 2% of your direct labor budget for work standards for an individual incentive plan?* If your annual wage bill (for hourly workers) is \$1,000,000, a minimum amount for maintaining a good

work standards program for individual incentives under most operating conditions would be \$10,000 equal to the annual salary of a "fair" industrial engineer). Unless you are willing to spend much more than this 1% during the first year of your contemplated incentive plan, then you had better settle for a plant-wide annual bonus plan or for group bonus plans.

4—*Do you have a large number of working "group leaders"?* If you have, then you stand a better chance of succeeding with your group incentive plan than would be the case if you had to select and train such group leaders. This is important when it is remembered that no plan can be any better than the leadership given it—from top to bottom. And without group leadership—working group leadership—a group incentive plan generally does not have the same pull (or drive) that such a plan has when operating under journeymen craftsmen or group leaders.¹

5—*Are you prepared to turn over methods improvement savings to*

¹As used in this article a group leader is an operator who does some supervision and direction and who works with a small colony of operators as in a machine or bench area. Such a group leader usually gets a small pay differential over and above the base pay accorded other operators within the same job classification or class of work.

ive questions should guide you

groups of industrious and ingenious operators who devise new and better ways? Companies that have allowed their first-line supervisors considerable autonomy in the operation of their departments are inclined to transfer some of this autonomy to groups and group leaders when a group incentive plan is installed. The theory behind this is: Don't stifle industry and initiative by throwing up a lot of road blocks in front of supervisors and group leaders; the more latitude you give leaders, the better results you will get. In theory (and in general) this is good management philosophy. But be prepared to handle a situation like the following:

Years ago a sewer pipe manufacturer held out as bait the possibility of going home after a "drawing crew" had removed the sewer pipe from a kiln and stacked it in a yard some distance from the kiln. This 6-man drawing crew was on day-work (not incentive). But a semi group incentive plan was incorporated in a company offer to allow this crew to go home after a 36-ft. kiln had been drawn. In other words, each member of the crew would receive his 10 hours of daily wage for removing and stacking the sewer pipe from one kiln—regardless of how long it took the



No clear cut case can be made.

crew (8, 10, 12, 14 hours). The drawing crews "bought" this and went to work. They not only worked harder and faster than they did formerly but they worked more ingeniously. The head drawer (group leader) would work as hard as any of his men in addition to his paper work and other duties. Finally, this 6-man crew got this drawing job down to such a fine point that they finished up a kiln in from 3 to 5 hours (including a 30-minute breakfast break); in other words they beat the company's estimate by more than 50%, time-wise, or 100% production-wise.²

There are other questions that could be raised in connection with

²Unfortunately this problem went to arbitration before it could be resolved.

The big question: what are the variables?

group incentive installations. But the foregoing five questions will illustrate the ideal conditions for the installation of a successful group incentive plan. Proper answers to *all* of these five questions are not necessary for a fairly successful group incentive plan; but the fewer the proper answers, the less chance for success of such a plan in a given location.

Although it is difficult to generalize on the merits and shortcomings of individual and group incentive plans, certain broad principles may help the reader to decide whether to adopt an individual incentive

plan or a group incentive plan under a given set of circumstances (in addition to the five guide questions raised previously):

1—The more you separate individual effort and individual reward, the more you dilute the incentive pull. Thus a company-wide bonus plan (based on total factory output or profits) will not have the same incentive pull on workers as a group bonus plan because there is too big a gap between over-all company operation and small group effort. By the same token, a group incentive plan, generally, will not have the same pull or drive as an

The Lincoln Electric Profit Sharing Plan

The Lincoln Electric Profit-Sharing Plan has long been cited as a good example of a company bonus plan. The individual piece work plan was in existence at the Lincoln Electric Company many years before the adoption of the Profit-Sharing Plan. The conventional piece work plan is, today, an important cause of the high productivity per man hour achieved there, even though remuneration realized by employees from it is less than what they receive from the annual bonus. It should be noted, too, that the Lincoln Company's standard wage scales are about the same as community rates for similar kinds of work; the annual bonus which frequently equals the annual wages has the ef-

fect of doubling a worker's income for a particular year (compared with what he would get if he worked elsewhere in Cleveland). It would be interesting to find the practical answer to the question: "Which is stronger, individual or group incentives?", if the Lincoln Company dropped its piece work plan in half of its operation during one year or dropped its piece work plan entirely for a year. The fact that the Lincoln Electric has maintained its individual piece work plan in operation for well over three decades instead of relying solely on its huge annual bonuses is indicative of what one highly successful company thinks of piece work or individual incentive.

individual incentive plan.

2—The less work measurement you put into a group incentive plan, the greater the dangers. Witness the sewer pipe drawing crew illustration previously cited. While it is true there is not as great a need for detailed elemental time studies in a group incentive plan as there is in the case of individual incentive plans, some detailed work measurement is necessary, if incentive troubles are to be minimized.

3—Group incentive plans have easier and smoother sailing in those industries that are well steeped in them than they do where a company attempts to set up a group incentive plan without union or industry experience.

Thus a clear-cut case cannot be

made for either the individual incentive plan or the group incentive plan.³ Like so many other management techniques, the decision to adopt either depends on the variables in a given situation. Indeed, as pointed out by the writer in previous BLUE BOOK articles, there are circumstances under which it would not be advisable to adopt any kind of a financial incentive plan—individual or group. . . .

³Throughout this article the writer has mentioned "individual incentive plan" and "group incentive plan." In reality, of course, each of these represents a whole family of incentive plans (e.g., straight piece work; Taylor Differential Piece Work; Emerson Efficiency Plan; Halsey Plan; etc.).

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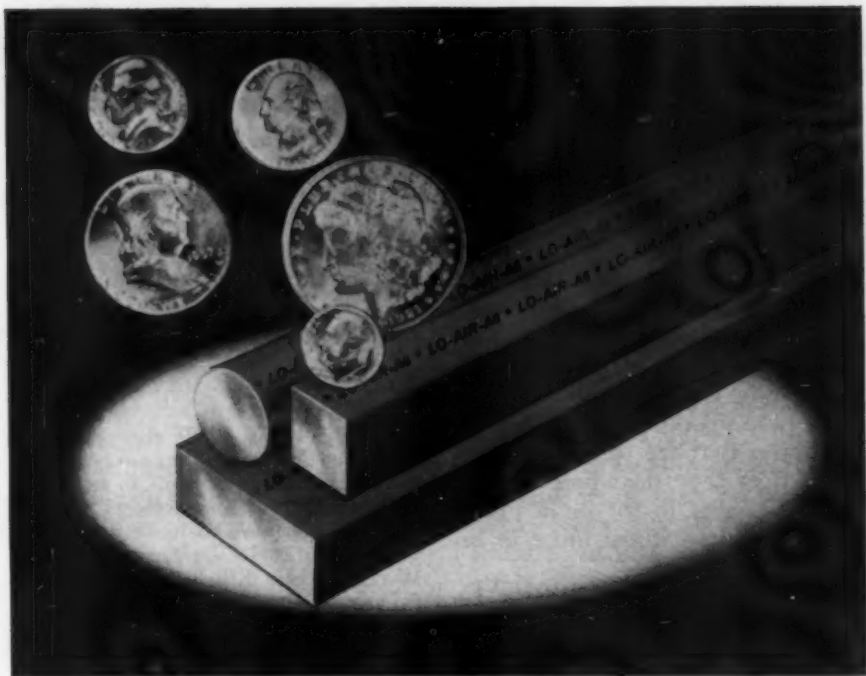
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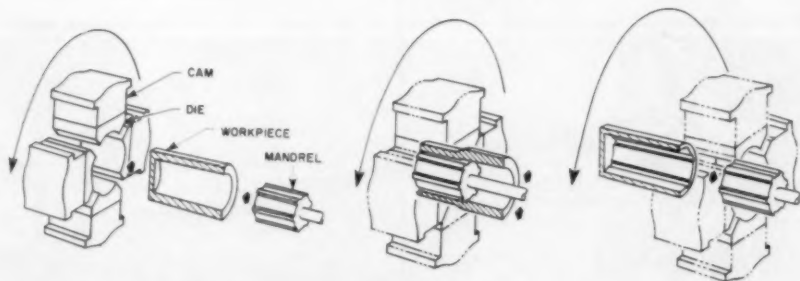
CINCINNATI—A new machine in Cincinnati Milling Machine Company's "chipless machining" family will quickly and accurately produce complex I.D. profiles in cylindrical workpieces. This machine, called the Intraform, uses a set of four forming dies which pulsate rapidly while revolving around the workpiece.

A mandrel is inserted in the work prior to it being squeezed by the dies. At the completion of the operation, the profile of the mandrel has been reproduced in the I.D. of the part. Tensile strength and surface finish have been improved. I.D. profiles produced by the machine range from heat exchanger fins to the highly accurate lands and grooves in rifle barrels.

The dies are mounted on cams which

contact a series of free-wheeling, hardened steel rollers located in the machine headstock. The top surface of the cam has the form of a sine curve, and at no time loses contact with the rollers. A smooth, continuous squeezing action results occurring more than 1000 times per min. Contact with the rotating dies causes the part and mandrel to revolve, but at a somewhat slower speed than the dies. At the same time, the work is fed over the mandrel and toward the rear of the headstock. Since only the workpiece has a feeding traverse, long work may be internally formed with a short, relatively inexpensive mandrel.

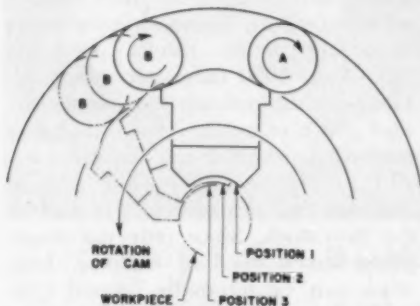
I.D. profile forming by this method can be applied to any type of ferrous or non-ferrous parts ranging from



Sequence of steps in Intraform forming a part.

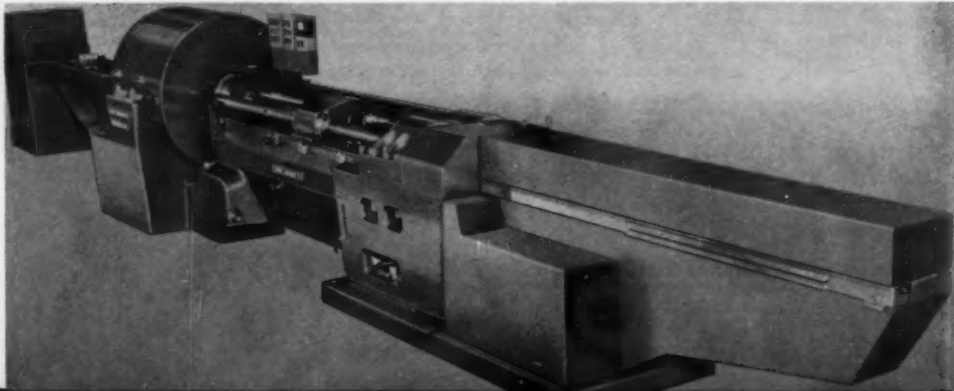


Internal hexagon, cold formed in 16 sec.



Rotating cam, passing under the rollers, moves without interruption from one to the next, as from "A" to "B". Continued rotation under roller "B" advances the die radially from positions 1 to 3, exerting a steadily increasing squeezing pressure on the work.

Intraform Machine, new member of Cincinnati Milling's "chipless machining family."



COLD FORMING continued

about 1/8" to 5" diameter, and made from pre-machined blanks, tubing, castings, forgings or extrusions. Laminated tubing can be made by form-bonding two or more metals. The bond is exceptionally strong and tight. Forming operations for which a mandrel is not required also may be performed on tubular and solid work. These include pointing, reduction of diameters, and forming of taper and radius.

Surface finish improvement is a direct result. Rifle barrels, for example, have a 32 micro-inch finish after drilling and reaming. After the Intraform operation, which forms the rifling, the finish averages 7 to 8 micro-inches. As for accuracy, some types of parts have been held to .0002" limits for the I.D. profile.

This type of cold forming also improves physical properties. Tensile strength can be improved as much as 30%. In addition, the continuous flow lines created in the profile formed area greatly add to the fatigue life of the part in service.

Quite often, less stock is required than for conventional machining. A high speed steel pin for example,

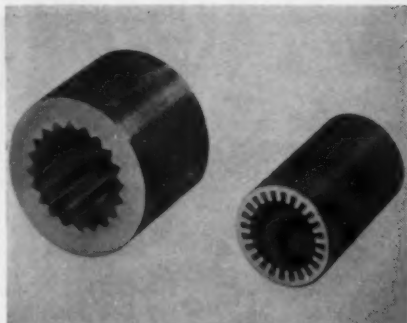
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JULY



Forming inside profile of ratchet (left) from ALSI C-1020 material took 15 min. set-up time with production at 300/hr. **Right:** Fins of copper heat exchanger tubing were formed at rate of 16" per minute. Set-up time took 30 minutes.

turned from stock 8½" long, can be formed from 4½" lengths.

Complete information on the new Cincinnati Intraform Machine and its unique "chipless machining" process



Bonding different metals. Left: brass lining is bonded to steel tube at rate of 24" per minute, 25 min. set-up time. **Right:** Copper lining is bonded to aluminum tube at rate of 24" per minute and set-up time taking 25 minutes.

may be obtained from the Meta-Dynamics Division of The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. Ask for their publication No. M-2060.



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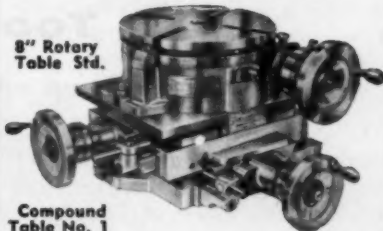
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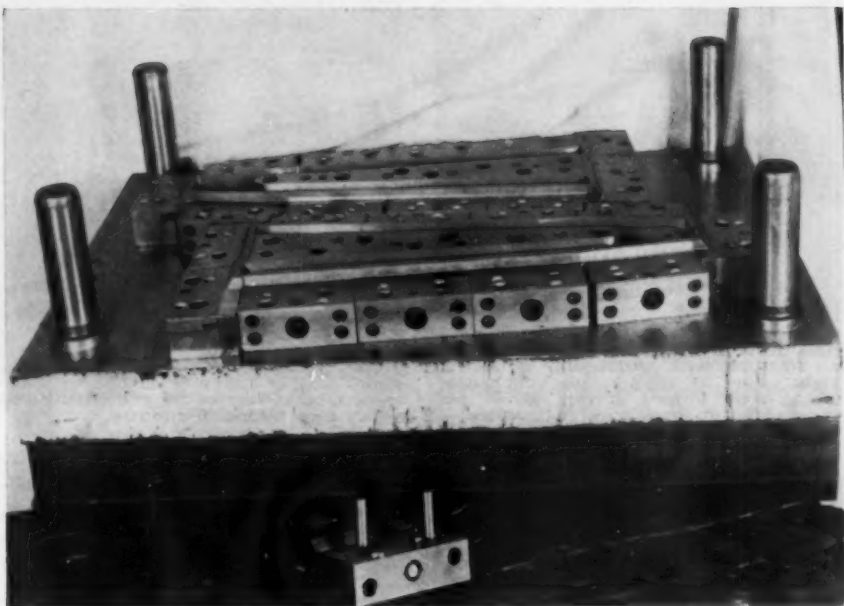
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Rivera adjustable sections are a standardized series of "mechanical" two piece sections designed to replace the solid steel sections.

Re-Usable Die Sections Cut Tooling Costs

Die is built up with standardized sections

DETROIT—Current applications of a new method of die construction—a standardized series of "mechanical" 2-piece sections designed to replace solid tool steel sections—appears to be saving users in initial die investment costs and production downtime. In addition, the nature of the die is such that it has a high reusability value, as the basic sections can be modified for other jobs.

This new concept of die building

has been patented by the A. R. Rivera & Sons Tool and Die Co. of Detroit. Their approach to the problem of providing more flexibility in press tooling is to mount two standard sections of steel on the base. To this mount the blade is fastened. This cutting edge, while held completely rigid, can be adjusted in location up to $\frac{1}{8}$ -in. by a simple allen wrench adjustment.

One flanging die is doing the work of three at a Detroit fluorescent light

fixture manufacturing company; this represents a die investment savings of over 66 per cent. By incorporating the use of Rivera adjustable sections, one flanging die was constructed to flange all thicknesses of metals from 1/32 to 1/2 by a simple allen wrench adjustment for the required daily runs. Daily down time to alternate the three dies in the same press was eliminated; all adjustments to the adjustable die are made with the die in the press.

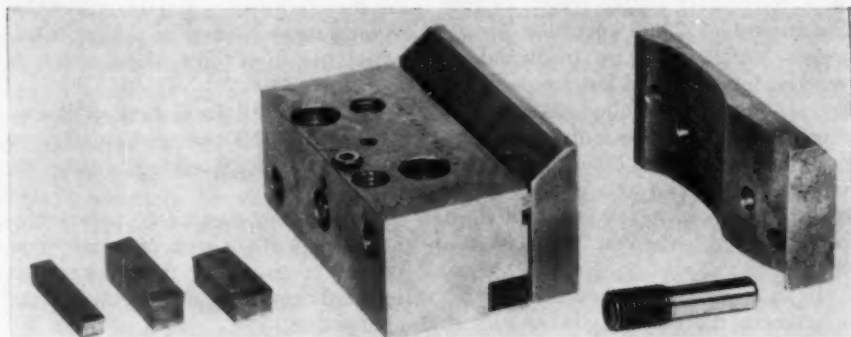
Blanking Die

A two-staged blanking die, designed and built at 14 per cent below the lowest solid tool steel estimate for a Detroit stamping company, produced a uniform perfect blank at the rate of 3400 pieces an hour. Production down time for resharpening was reduced at least 50 per cent as repositioning of the sections was eliminated by taking advantage of the full .125 in. adjustment for the ground off working edge. The reusability value to the stamping company by using the "permanent fixture type" 22 standard adjustable sections on future stamping dies

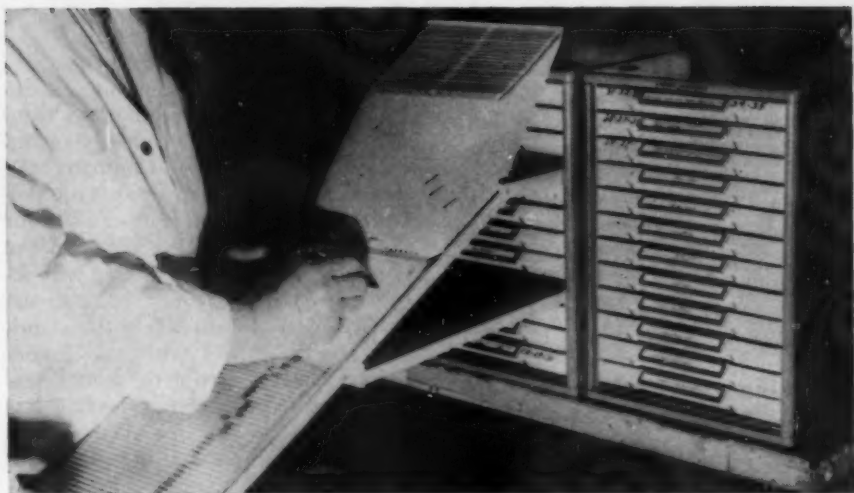
amounts to over \$800 instead of a scrap value of \$28.

Die cast trim dies for one of the Big Three automobile companies were delivered at an 8 per cent savings on investment. The Rivera Company estimates that production down time will be reduced at least 60 per cent for the entire 1959 run even though the aluminum die cast trimming will require several sharpenings due to excessive wear. By replacing the standard swedge dowel with the Rivera Screw Dowel, complete section extraction can be accomplished in less than a minute with one allen wrench with the die in the press. After resharpening the worn blade, adjustment is made for the amount of edge removal and the section is doweled back into the same dowel holes of the shoe. The .125" adjustability virtually eliminates resetting sections of the die after original construction.

In addition, a study of its application and its use in the General Electric Company is being made by the manufacturing services division in Schenectady, New York. . . .



Mounts and blades are integral part of process that enables user to modify the fixture-type die for future applications.



Visible Record System Reduces Ins

It tightens control over inspection schedules, too

By **William G. Hurd**, Chief Inspector
Richmond Machining Plant
Kaiser Aircraft & Electronics Div.,
Kaiser Industries Corp.

● A completely visible record system for control of 2,000 precision instruments which must be inspected at weekly, monthly and less frequent intervals has been installed at the Richmond Machining Plant of Kaiser Aircraft & Electronics Division. Signals which can be read at a glance tell us exactly when a tool is scheduled to be inspected, when it was last in-time.

If an instrument scheduled for inspection on a certain day is not turned in at our Precision Instrument Crib, we can immediately put our finger

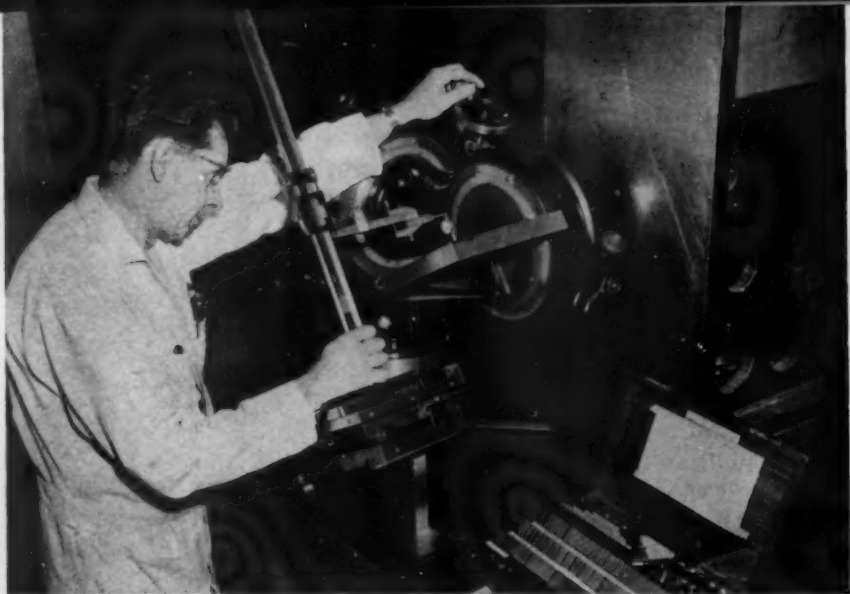
on all necessary information for follow up. A bright, red signal marks it until inspection is accomplished.

Scheduling a day's work in inspection is accomplished in one-third of the time required when our inspection records were housed in a blind cardboard box file. This alone saves us an hour a day.

Posting new information after each inspection is 100 percent quicker. A 30 percent overall saving in time has resulted.

In addition, customers' representatives frequently check our inspection records to ascertain that precision standards are being upheld on government orders.

Our records, within arm's reach of inspection tables, are housed in two



Instrument Inspection Costs at Kaiser Aircraft

of the new Remington Rand Kardex Aristocrat cabinets.

In each of the some 60 Kardex pockets, we have an 8" x 8" card with appropriate blanks into which are entered the date inspected, the condition or size of the instrument on that date, remarks, and the inspector's stamp. The serial number, tool description, tool number and card number appear at the top.

On a permanent title insert at the bottom (which is the visible index), we have the owner's name, his badge number, and identifying information for the tool.

The title insert is printed with a scale from one to four, and another scale providing ruled blanks for each month from January through Decem-

ber. Attached to these scales are 1/4" color-coded Kardlok signals. The 1 to 4 scale at the left of the insert is the signal scale for instruments which must be inspected on a weekly basis.

Pink signals are used for tools which must be inspected weekly. The day of the week on which an inspection is due is actually printed on the signal. In the same manner, an orange signal is used for the monthly scale. Printed on the monthly signal, however, is a number to indicate the day of the month an inspection is to be conducted.

In addition, there is space on the visible title insert for attachment of a blue signal when a tool or instrument is placed in reject status. This serves as a permanent reminder. A

INSTRUMENT INSPECTION continued

red signal is attached when any tool is overdue for inspection.

It is simple now for us to schedule inspection work. An inspector pulls a slide and, without so much as flipping a pocket, can see exactly how much work is scheduled for any given day among pockets in that slide.

When running an inspection, he simply goes to the proper slide, pulls it, and glances down the visible title inserts until the proper tool is spotted. He flips open the pocket, then inspects the tool on the nearby bench. Without taking the card from the pocket, he enters date, condition, remarks and his stamp after the inspection is complete. He moves appropriate signals and goes on to the next inspection job.

Each of the cards has space for entries representing 24 separate inspections. After these spaces are filled, the cards are "stored" in an upper flip-back portion of the Kardex pocket, and a new card entered in the lower part. Thus, we have a complete record on any given tool in one place.

After an inspection, an inspector simply notes date, condition of size of instrument inspected, adds any remark and affixes his stamp. The card is not removed from pocket.



After an inspection is complete, the inspector simply moves Remington Rand Kardlock signal to next week or month, depending upon whether inspections are conducted once a week or once a month. Printed on the signal is the day of week or day of month on which the next inspection is to be conducted. If an instrument is to be rejected for further use the inspector puts a blue signal (row at far right) into place.





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All Hard Tungsten 18-4-1



DI-ACRO ROD PARTER cuts off 3,250 pieces/hr. for Geometric Stamping Co.

Donald Boyd, methods engineer, shows parted stock and the formed part, handle for material handling equipment.

About 1½ million pieces of bar stock are parted off each year on a Di-Acro Power Rod Parter at the Geometric Stamping Co. Div. of Euclid Stamping Co. in Cleveland. Twenty-foot lengths of 5/16" cold drawn steel are cut to 7" pieces at a rate of 3,250 pieces per hour.

"Instead of investing in a single purpose punch press die," says Donald Boyd, methods engineer, "We picked the power parter for its versatility. On this job and a variety of other work the power parter has increased production two times—it's actually twice as fast. Incidentally, there has been little or no maintenance other than periodic lubrication and resharpening of die heads."

For your bar stock up to 5/8" in diameter, investigate the Di-Acro Rod Parter. Speedmatic gauge cuts as fast as operator can feed. Minimum distortion—pieces can be threaded without deburring. One standard die cuts eleven sizes of rod. Special heads for square, hex and other shapes.



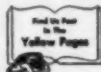
DI-ACRO HAND OPERATED ROD PARTER

Same size-range and accurate parting as power parter. Ejectomatic gauge automatically clears die after each cut.

pronounced die-ack-ro



For free booklet, "Handy Guide to Rod Parters," consult yellow pages under Machinery—Machine Tools for your nearest Di-Acro distributor, or write us.



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MACHINE and TOOL BLUE BOOK

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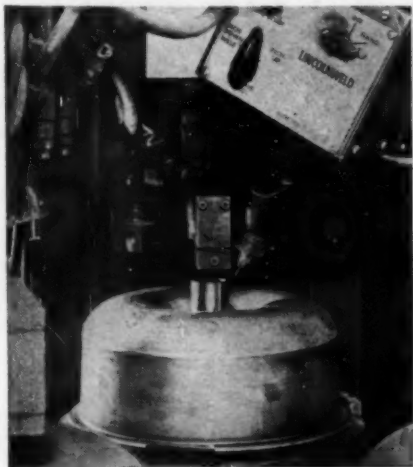
Welding High Carbon Steel Hubs to Low Carbon Stampings

● Pump housings for turbo-type automatic transmissions are deeply drawn stampings of dome-like shape. Those used in Buick Dynaflo transmissions, as well as in some on other makes, required that the flanged hub be joined to the stamping by a circular submerged arc weld. In Buick transmissions, the hub is made from SAE 1062 steel that is hardened to 60 Rc minimum, subsequent to welding, and then is ground.

It is Buick practice and that followed in some other plants to preheat high carbon steel parts before welding to softer steel is done, to aid in producing good welds. At the Chicago Borg & Beck Division, Borg-Warner Corporation plant, which makes components for one model of Dynaflo transmission, welds are being produced, however, without preheating of either component.

This welding is done in a Progressive indexing machine, equipped with a Lincoln Electric submerged arc head, after both parts are passed through an automatic washer to insure freedom from oil, grease and foreign matter that might interfere with high quality welds. These welds must be leak proof, as they are subject to considerable fluid pressure in service.

In general, hubs of this type are made a press fit in the mating hole of the housing, but Borg & Beck employs a free fit, as it is believed to aid the escape of gas produced in welding. Naturally, any trapped gas results in porosity. In loading the machine, the operator places the stamping in the fixture and sets a hub in the hole, requiring no equipment for a press fit. All operations on this ma-



Head and welding station. When the Lincoln head lowers and flux flow starts, the work piece is rotated and a circular weld is made around the flange of the high carbon hub.

chine, save loading and unloading (the latter including dumping excess flux from the top recess), are automatic.

Loading at a front station is followed by indexing to the welding station. There, just before slow rotation of the work starts, the head is lowered, granular Lincoln flux starts to flow and 1/8 inch wire then is fed down to strike the arc. At this instant, rotation begins and continues through about 365 degrees until the circular weld is completed automatically.

Then, when current is shut off, the head is elevated, flux flow stops, the weldment ceases rotation and is indexed to the unloading station for removal, flux being dumped into a hopper below the table. During the weld the operator loads the next pair of parts; they index to welding position to start the next cycle at the same time the weldment indexes to unloading position. Total cycle time is only 18 seconds.

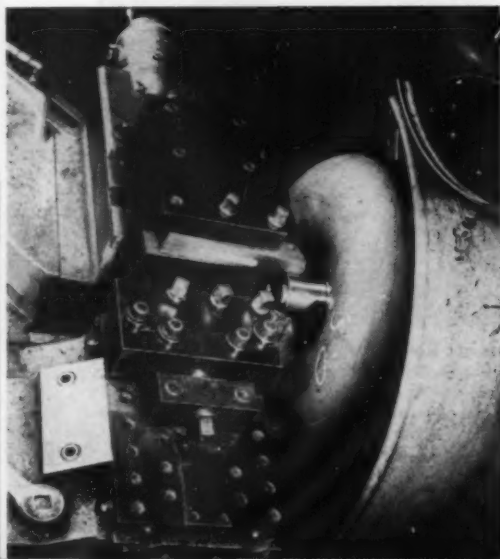
Welding current is supplied at 27

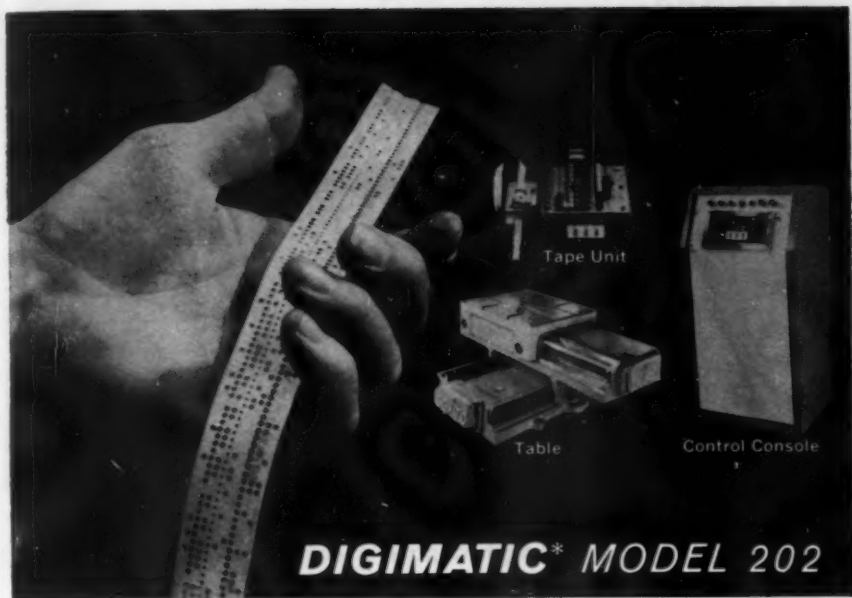
volts by a constant voltage rectifier of 800 ampere capacity, but the current drawn is 300 amperes. Welds are of so high a grade that pressure testing done originally after welding has been discontinued, because so few imperfect welds result, and is not done until after all machining of the weldment (including a portion of the weld itself) is completed. Even then, the number of leakers seldom exceeds four in an eight hour run of about 700 housings.

After welding, several machining operations and two induction hardening operations, both on the hub, are performed, two hub surfaces being given 60-62 Rc minimum hardness. Two facing cuts are made on the hardened hub flange in a Monarch lathe at 1000 sfpm to obtain a 30 micro-inch finish. One cut, involving the flange metal only, is made with a triangular throwaway titanium carbide (NM-95) tool. This tool produces a finish of 30 rms maximum and forty pieces per cutting edge.

At the outer edge of the flange, where the edge of the weld is cut, a square ceramic tool is used. It is the only tool tried that has stood up well at the high cutting speed. This tool averages about 150 cuts per edge. More pieces per edge could be faced, but, at about 200 pieces, the tool fails where the clamp that fastens the tool in the holder bears. This type of failure precludes employing the tool to cut at its maximum potential per edge. • • •

Weldment in a Monarch lathe, showing the titanium carbide tool and the ceramic tool that make facing cuts on the hardened hub flange and at the edge of the circumferential weld.





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Using tape controls to cut tooling costs is a fact.

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The advantages of applying hard-facing materials in powder form for lower finishing costs have long been known. But slow spraying speeds, low deposit efficiencies and high material costs have hindered their wide application. Now, with the development of the new METCO Type P THERMOSPRAY GUN and the THERMOSPRAY Hard-Facing Alloys, these disadvantages have been overcome.

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Grind 4 Sides, Deburr 2 Sides

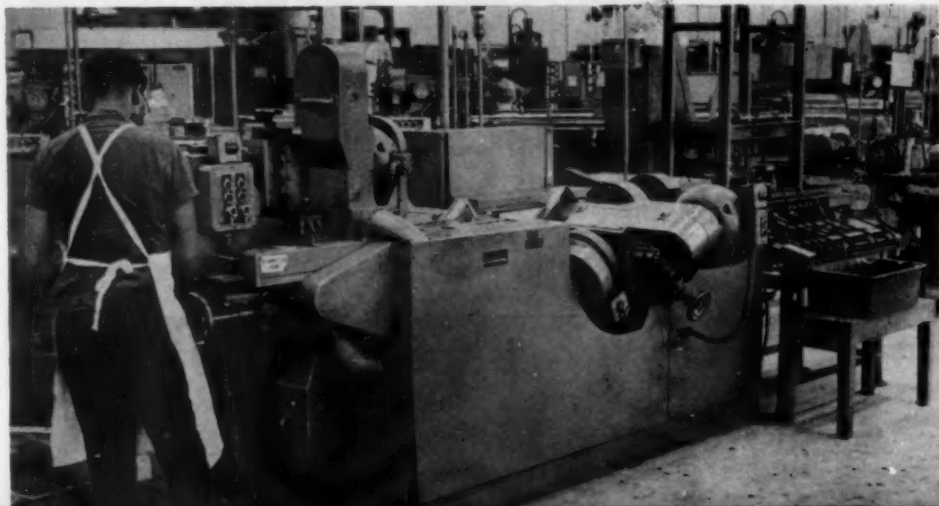
... in single automatic sequence of
two 6-in-1 multiple head belt grinders

● Two custom-designed six-head abrasive belt grinders enable the Lexington, Kentucky plant of International Business Machines' Typewriter Division to grind four sides of typewriter carriage racks and deburr milled slots on opposite sides of rack—all in a single automatic sequence. A development of Engelberg, Inc., of Syracuse, N. Y., these machines utilize four grinding heads mounted in vertical and horizontal sequence, followed by two wire brush heads.

The A1S1C1141 steel racks, .375" x .406" and .1857" x .312" vary in length from 6" to 30 inches in length and are used in the manufacture of IBM Electric Typewriters. Formerly, these racks were processed on a horizontal belt sander. After the grinding operation, it was still necessary to perform a separate deburring operation with a wire brush wheel to remove remaining burrs on milled slots.

The racks conveyed by powered feed rollers at 30 feet per minute, are

Typewriter carriage racks are loaded by operator on powered feed rollers which automatically convey racks past four grinding heads mounted in vertical and horizontal sequence and two wire-brush heads at thru-feed rates from 5 to 30 feet per minute.



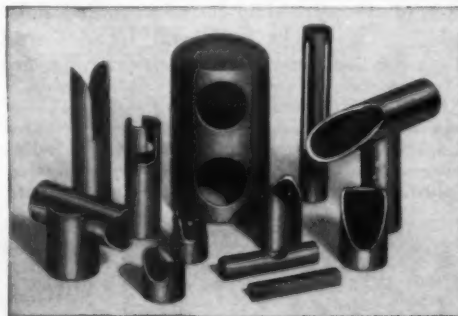
uniformly processed to a smooth finish by a series of four grinding heads. Milled slots on opposite sides of rack are then deburred by two wire brush heads. An outlet feed mechanism and conveyor with air operated stacking device provides completely automatic unloading and completes the automatic work sequence. Both grinding and deburring operations are performed dry and machine is equipped with two built-in dust collection systems. A $\frac{1}{2}$ H. P. variable speed motor provides selective feed rates of from 5 to 30 feet per minute.

Abrasive belts, 2" x 64", used on all four grinding operations are 80-grit aluminum oxide. Abrasive belt speed is 5000 surface feet per minute. IBM

reports belt life is in excess of 1000 parts per belt. Wire brushes are 2" wide by 10" in diameter.

Each Grinding Head is Individually Adjustable

Each head is individually adjustable for angular orientation and depth of cut and grinding heads are canted at 45° angles to utilize full width of abrasive belts. Abrasive belts are driven by 1 H.P. pancake motors and wire brushes are powered by a 3 H.P. pancake motor. Each head is supplied with an individual start, stop, jog, push button station and two master "panic" buttons which will halt all operations located at entrance and exit sides of machine. • • •



Samples of shearing and notching (also estimates) gladly furnished without obligation.

Look — at these sheared tubular ends — clean, true contoured and close fitting with a minimum of burr and distortion . . . You can make them fast, some up to

2000 an hour with Vogel patented tools. Or, if you prefer, we can do your notching, shaping, shearing and perforating . . . Either way

You save on cost!

ARC-FIT® notches up to 720 per hour.

ARC-SNUG prepares pipe ends for snug brazing—up to 500 pieces per hour.

ARC-TWIN® double notches pipe up to 750 pieces per hour.

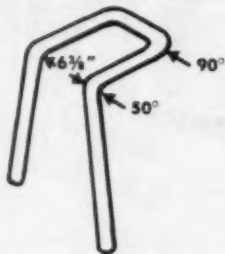
CUT-OFF shears tubing in two up to 2000 per hour.

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High Speed Chair Frame Bending

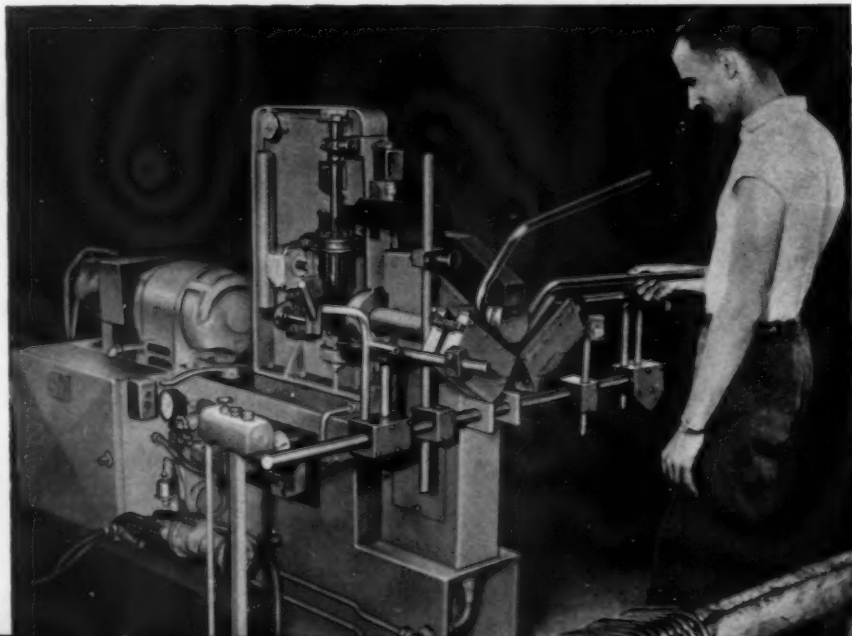


1. Back-leg frame, made from $\frac{3}{4}$ " O.D., 19-gauge steel tubing. Bends are on a $2\frac{1}{4}$ " centerline radius.

● An interesting example of economical high-speed chair-frame bending is the hydraulic bending-press operation at Harcliff Company, custom fabricators, Addison, Illinois. The press is a model 3-T manufactured by Pines Engineering Co., Inc., of Aurora, Illinois.

The part being bent, Fig. 1, is $\frac{3}{4}$ -inch O.D., 19-gauge steel tubing for use as a back-leg frame for a chair. The two 90-degree bends are spaced

2. Making the fourth bend in the chair frame on new Pines Model 3-T Press, which has an inverted ram to provide good working clearance. Note the system of stops for positioning work.



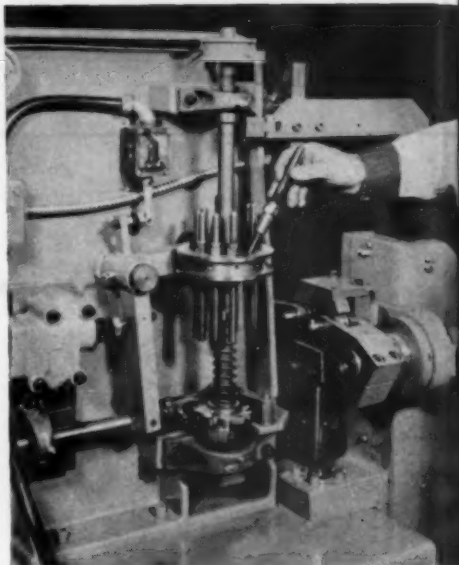
Field Reports

continued

so that the distance between the frame sides is only $6\frac{1}{8}$ ". The other two 50° bends are in different planes. This requires a wide-open tooling area for the press to avoid workpiece interference.

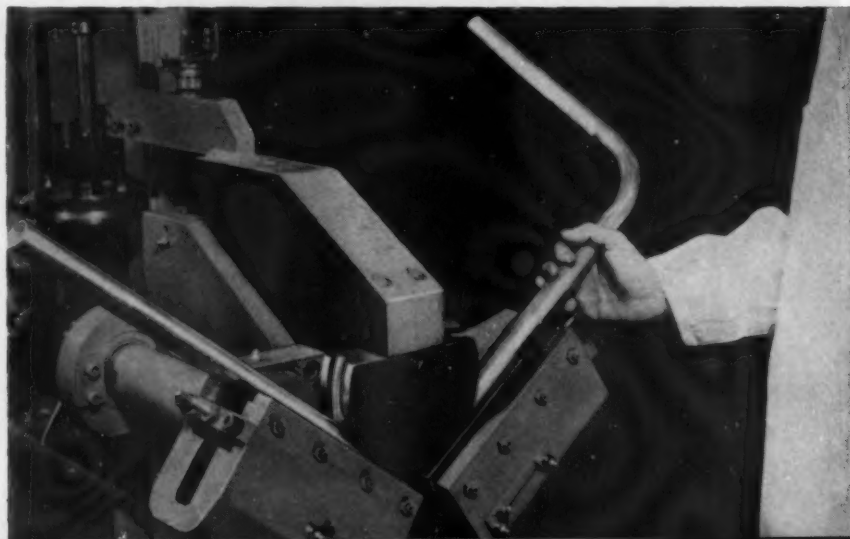
The four bends are on a $2\frac{1}{4}$ " centerline radius and are made progressively at one handling on the bending press, Fig. 2. It is equipped with an indexing turret, which automatically selects the angle for each successive bend. Adjustable stop pins, which provide for presetting and quick interchange in the turret, make it possible to change from one job to another with as little as 20 minutes setup time.

Fig. 3 shows the indexing turret which, in this case, uses four of its ten stop pins to produce the various



3. Indexing turret on the press automatically selects the angle of bend and makes it possible to do progressive bending at high speed. The adjustable stops lift out for easy interchange and can be pre-set and stored for future use on repeat jobs.

4. The wing dies wrap the tubing around the ram die and are mounted so they can slide within their holders to travel with the tubing and thus prevent draw marks.



bends. When the fourth bend is completed, the turret returns automatically to the number one position, ready for the start of the series of bends in the next workpiece.

In a lot run of 2000 of these four-bend frames the average number of bends was more than 1000 an hour. The hydraulically cushioned wing dies, Fig. 4, wrap the tubing around the bending dies as the ram descends.

These dies ride in ways, moving with the work as the bend progresses, preventing scratches or draw marks on the surface of the tube.

The wing-die cushion pressure is supplied by a single hydraulic cylinder, operating through a rocker arm assembly mounted at the rear of the housing. Cushion pressure to suit the particular bending job is set by a simple valve adjustment. • • •

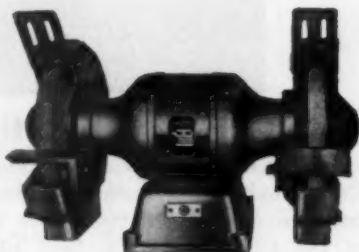
**makes
tough grinding
jobs *Easy!***

BALDOR

MODEL 183-10"

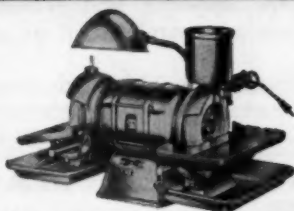
Rugged! Every part oversize to give years of dependable, trouble-free service—even on the most difficult grinding jobs. Ideal for use on large, odd-shaped pieces. Other outstanding features include:

- Rugged $\frac{3}{4}$ HP Baldor motor won't burnout even if repeatedly overloaded!
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- Wide-clearance construction provides more working room!
- Dynamically-balanced rotor plus patented wheel balancing process, reduce vibration to a minimum!
- Big 10" fast-cutting, long-lasting wheels!



Single phase, $\frac{3}{4}$ HP, \$154.00
Three phase, 1 HP, \$150.00

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Model 153-6". Reversible $\frac{1}{2}$ HP motor, 3450 RPM. $1\frac{1}{2}$ " wide wheels. Every part oversize for rugged, long-lasting use. Just \$189.00.

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14 Operations in 6 Minutes

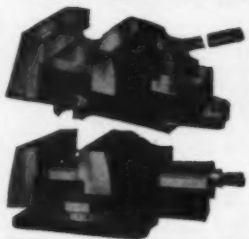
CLEVELAND—Two Warner & Swasey 2AC chucking automatics are used to machine complicated steel valve seats at the Cleveland Rock Drill plant, Le Roi Division of Westinghouse Air Brake Company. One automatic chucker machines the initial side of the workpiece; the second machine completes the opposite side. Fourteen operations are completed in six minutes.

Workpiece material is tough, forging quality steel of 72 to 90 Brinell, burned

out of plate stock to form rough blanks. Carbide and high-speed steel tools are employed for drilling, boring, various facing operations, radius forming, grinding relief cutting, chamfering and forming angles.

A special trepanning arrangement is used to cut a circular groove in one face of the blank, holding a tolerance of $\pm .003$ " on the diameter and $\pm .005$ " on depth. A parallel limit of $\pm .003$ " also is achieved in facing operations. • • •

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SHAPER VISE with Graduated Square Swivel Base (Size No's 4 & 40) Base is graduated and has tongue in center to fit slot in table. Also holes for bolting down.

Size No. 4—6" jaws, 1 1/2" deep, opens 5". Price \$109.50

Size No. 40—10" jaws 2 1/4" deep, opens 8 1/2". Price \$148.50

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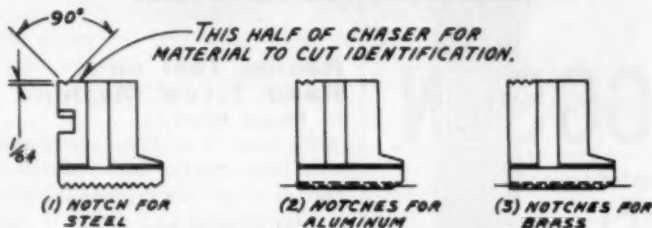
End Your Threading Troubles

By **Harold D. Rhodenbough**

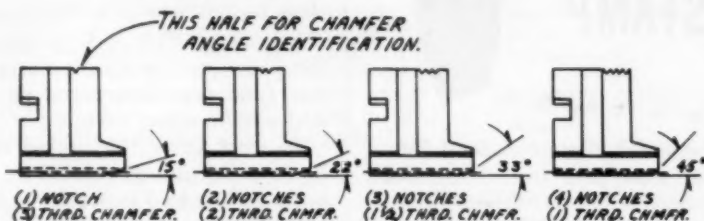
● The die head marking system shown, using a notched code to identify chasers and dies ground to cut various materials and another code

to indicate the chamfer angle, will positively reduce the number of parts scrapped and loss of time occurring because someone selected the wrong tools for a threading job. ● ● ●

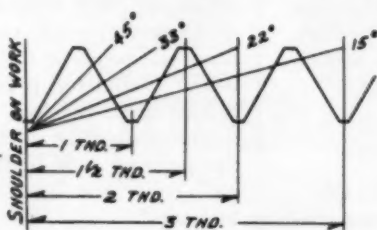
MARKING CODE FOR DIE HEAD CHASERS



IDENTIFICATION OF MATERIAL TO BE CUT



IDENTIFICATION OF NUMBER OF THREADS CHAMFERED



EXAMPLE:
TO THREAD WITHIN
2 THDS. FROM
SHOULDER, USE
22° OR 33° CHAMFER

TOLERANCE:
DECIMALS ± .003
FRACTIONS ± .010
ANGLES ± 1/2°

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mark

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HOGGSON
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STAMP**

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HOGGSON & PETTIS MFG. CO.

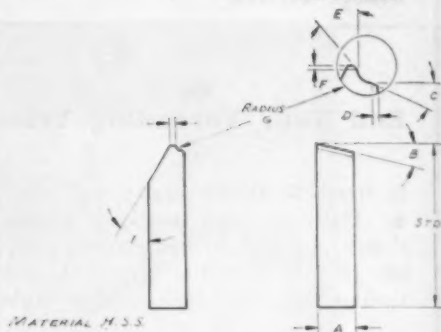
141H Brewery St. New Haven, Conn.

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130

Shop Hints

continued



MATERIAL H.S.S.

O.D. RADIUS TOOL - CUT OFF END

Tool No.	A	B	C	D	E	F	G	H	I
WS-5130	1/2	5/8	6"	5"	1/32	5"	1/32	.030	1/16 30°

Radius Tool on Hand Screw Machine

By Harold McIntyre

● Frequently on hand screw machines a radius on the O.D. of the cutoff end of a bar stock piece is called for.

The general inclination in these instances seems to be to add a lathe operation to form the radius rather than incorporate it in the screw machine setup. This adds to the cost of the piece part because a move operation from one department to another and a lathe setup are added.

In most cases this added cost can be economically eliminated by designing a radius tool to work on the cutoff end.

By tabulating the original design as shown, this style of tool can be made to cover all sizes of this tool from one print by filling in the block below. Tabulated prints on this type of tool make developed tools standard in the shop that develops them and the reduced cost of tool design may well cover the cost of building the tool itself.

• • •

MACHINE and TOOL BLUE BOOK

Production..... more than Doubled

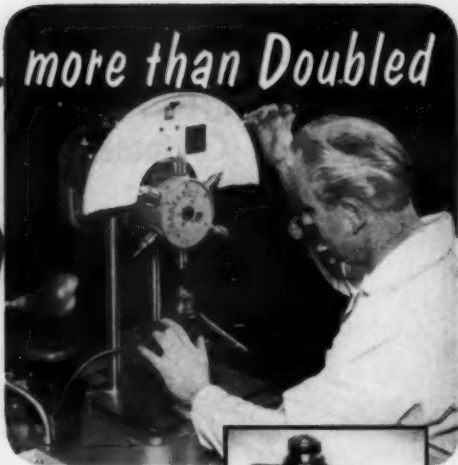
with

BURGMASTER

(Bench Model)

6 Spindle Turret Drill

- \$150 special drill jig eliminated
- Saves 2.5 miles moving per lot
- Reduces floor space 66%



Har-Bar Engineering Co., Long Beach, Calif. manufacturer of precision aircraft and missile parts, and designers and builders of special assembly machines, more than doubles production and eliminates a \$150 drill jig on a small missile part. The six spindle Burgmaster is double tooled to center drill, drill and c/sink 3 precision holes with 120° locations at the rate of 60 per hour. The parts are held in a hand indexed, standard Hardinge Collet index fixture. All 3 operations are performed at one setting, before indexing. Tolerances $\pm .003$, $-.001$

The six spindle turret is *double tooled and power indexed* to carry out a consecutive series of operations, in a minimum of time. *Pre-selective, automatically shifted spindle speeds* for each spindle and *sensitive hand feeding* insure fine finish, accuracy and longest tool life. Each spindle also has pre-set depth control. It is estimated that the other method would require 2 operations and 2 setups and the operator would walk 2.5 miles in front of single spindle drills while machining 550 parts. Now the operator remains seated.

"The Burgmaster was purchased for this new job to reduce costs and to produce parts at more competitive rates."

Your nearest dealer

will be glad to give a free demonstration of the Burgmaster to prove how you can cut your drilling costs. Ask for free literature.



JOB FACTS

Company: Har-Bar Engineering Co., Long Beach, Calif.

Part: Special Stud-N1 Silver & Gold Plated

Material: Aluminum Alloy

Size: $\frac{1}{2}$ " long x .450 dia.

Lot: 550

Tolerance: $\pm .003$
 $-.001$

Chuck: Std. Hardinge Collet-
Hand Indexing Fixture

Operations	Speed
1. Center Drill	3300
2. ± 40 Drill	2200
3. 100° c/sink	900

Production: 60 Parts per Hour

Advantages: More than Doubles
Production • Eliminates a \$150
Drill Jig • Saves Walking 2.5
miles • Reduces Floor Space
66%

Machine Cost: \$550 plus extras.



MODEL "O"
1/4" CAP.
IN STEEL

AUTO INDEXING TURRET
DRILL & TAP MACHINE

BURGMASTER CORPORATION

SMALL TOOL DIVISION — BURG TOOL MANUFACTURING CO., INC.

15001 South Figueroa Street, Box 311, Gardena, California

Phone: FAculity 1-3510 — Phone, wire or write Dept. OA

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**Quick Delivery
+ Low Prices
= Satisfied Customers**

AGMACO

PRECISION GAGES



We can ship 90% of your gage requirements the same day we receive your order. All gages are manufactured to American Gage design standards from highest quality tool steel and are **precision lapped** for overall accuracy finish and wearability of the gaging surface. Agmaco Precision gages are priced **low** in comparison with gages of comparable quality.

SIZE RANGES

Plain plugs .025 to 7.000 ins.
Plain rings .248 to 3.000 ins.
Thread rings and .030—.125 to 12.000 ins
thread plugs

Dealer and Mfg. rep. inquiries invited—
Attention dealers: **No investment** required on our proven sales plan.

**Production GRINDING
PROBLEMS ???**

Active Grinding & Manufacturing Company offers a complete grinding service backed by skilled men with years of experience solving complex grinding problems. Send us your prints for immediate quotation.

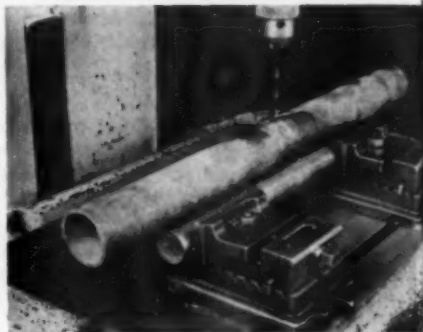
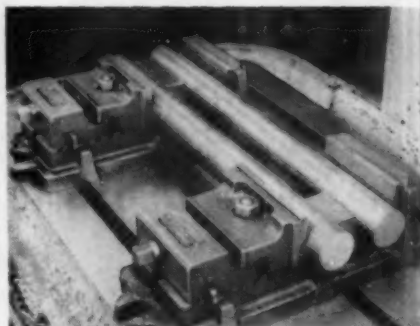
Active Grinding & Mfg. Co.

Phone: MOntroe 6-8567
2119-21 W. Hubbard St., Chicago 12, Ill.

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Shop Hints

continued



**"V" Support for
Drilling Long Work**

By H. J. Gerber

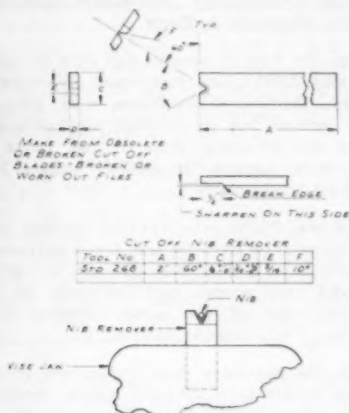
● It is sometimes necessary to drill holes into long rounds of large diameter. Conventional "V" blocks are too small to adequately support work of this kind on the drill press table so I often make use of the illustrated improvisation.

Two lengths of round bar stock (or tubing) are seated in a pair of identical drill press vises. A square block spacer, either wood or metal, is then placed between the two rounds in

each vise and the vise jaws are clamped tightly against these assembled pieces. The result is a "V" nest of any desired width or length into which the work can be seated accurately and securely.

It is usually not necessary to bolt the vises to the drill press table but if the holes to be drilled are of large diameter it might be a good idea.

It will be noticed that the placing of spacers between the two rounds also provides an open space into which the drill can run when it pierces through the work. • • •



A Simple De-nibbing Tool

By Edward McIntyre

● Removing the cutoff nib is an operation that adds to the cost of most bar stock parts. A dull or off-center cutoff tool will produce a sizable nib on the cut off part.

Shown is a simple nib remover that can be made at negligible cost from worn out or broken cutoff blades and files. A machine operator can knock the nib from a cutoff part by placing the nib in the V and tapping the part with his hand or a small rawhide hammer. • • •

Another

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Top Quality
Lowest Prices

Our Special Import...

DIAMOND WHEEL DRESSERS

Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

Karat	Regular Price	Our New Price
1/4	\$ 6.00	\$ 2.85
1/2	12.00	5.00
3/4	21.00	7.50
1	30.00	10.25
1 1/2	54.00	15.00
2	75.00	20.00
2 1/2	102.00	26.00
3	130.00	32.00

These diamonds can be set in any shank to your specifications for \$1.00 each extra.

Order today—Immediate
Delivery From Stock!

VICTOR Machinery Exchange, Inc.

Dealers in Tool Room Equipment

Dept. A, 251 Centre St.

TeL: CAnal 6-5575, New York 13, N.Y.

Free Literature

MACHINE AND TOOL

blue book



(See Number 1)



(See Number 2)



(See Number 3)

To receive copies of booklets described below, circle their identifying numbers on an Action Card, found opposite pages 72 and 200.

1. Air Operated Chucking Systems are fully described in Bulletin PO-66D. Chucks and cylinders meet requirements of heavier feeds at higher speeds. They maintain closer tolerances on prolonged repetitive production runs. The Cushman Chuck Co., Hartford 2, Conn.

2. Drill Jig Bushings for use in plastic jigs and fixtures, the subject of Catalog 355811, are composed of oil-hardening bearing steel. Trans-Lok bushings and bushing liners are made for embedding in castable materials and Press-Lok bushings for pressing into drilled holes in plastics, wood, or soft metals. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

3. Carbide Tipped Saws. Eight-page catalog section tells how to select the proper type carbide saw for a particular use, contains a selection guide for proper diameter, number of teeth and saw speed, and instructs in the proper care and handling of the saws. Disston Div., H. K. Porter Co., Inc., Philadelphia 35, Pa.

4. Machinists' Tools. Micrometers, test indicators, rules, combination squares, protractors, straight edges, verniers, depth gages, surface gages, fillet and radius gages, thickness gages, etc. are presented in comprehensive catalog (No. 37M) available from Brown & Sharpe Mfg. Co., Providence 1, R. I.

5. Diamond Tools. Loose-leaf catalog tells how to get most out of diamond tools and illustrates and describes the manufacturer's complete line. The booklet also contains a table which may be used for determining the size of diamond needed for a given wheel. Wheels from 1/2" face, 6" dia. to 4" face, 24" dia. are listed. The Hayfred Co., 33 Lyman St., Springfield, Mass.

6. Vibration Pad. Vibra-Check vibration-damping pad is composed of vinyl and fiber glass and is not affected by moisture, oils, detergents, brine, and other chemicals. Claimed to increase worker comfort and lessen fatigue, increase equipment life, precision and out-put of work. Will hold up to 7500 lb per sq inch. Folder from Lowell Industries, Inc., Boston 34, Mass.

7. Engraving Machine Equipment. Attachment and accessory catalog presents such items as cutter grinders, Electro-markers, adjustable copy holder units, single copy slides, tracing styles, work holding devices, and master index fixtures. H. P. Preis Engraving Machine Co., 242 Industrial Branch, Hillside, N.J.

8. Lubricant Selector Chart facilitates the choice of the proper lubricant for practically any extreme pressure lubrication job. It evaluates every type in the Molykote lubricant line based on temperature, environment, method of application, incorporation into common materials. Alpha-Molykote Corp., Stamford, Conn.

9. Boring Bars, Tool Holders are described and illustrated in catalog. The booklet presents a new cutting-off tool with adjustable spring action—high or low tension. To prevent tool breakage, the tool actually jumps off the work when overstrained. R. B. Tool Co., Inc., 340 Maple Ave., Westbury, L. I., N. Y.

10. Shaper. Steptoe-Western Model 12X shaper, with a maximum stroke of 13½" and 16 geared speeds, has base and column cast of semi-steel, with integral oil sump in the base. Heavy, ribbed vee ram is planed and hand-scraped and provided with adjustable positioning lock and stroke indicator. Folder from Western Machine Tool Works, Holland, Mich.

11. Radii Milling. The McK Model 12 Radii will mill radii on square, hex, flat or round bar. Uniform accuracy eliminates

trial and error. Variable cutter speeds for any material. Folder from McKay Machine, Youngstown, Ohio.

12. Air and Hydraulic Equipment. Bulletin 7A covers special air and hydraulic machines. Pictured are 15-ton semi-automatic hydraulic die casting machine, 25-ton horizontal type hydraulic assembly machine, hydraulic assembly press. Logansport Machine Co., Inc., 832 Center Ave., Logansport, Ind.

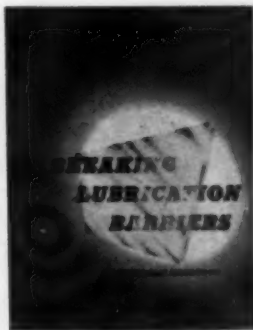
13. Polishers. Struers DP (diamond polishing) equipment includes discs, DP-III hand polisher, DP-IV standard polisher, and DP-V built-in model. Folder available from William J. Hacker & Co., Inc., 82 Beaver St., New York 5, N.Y.

14. Mist Coolant System. Photographs in Bulletin F-7 show how the Spraymist unit improves cooling efficiency and work finish and increases tool life in boring, grinding, milling, tapping, sawing and turning operations. Booklet also contains information on Spraymist Jets with "tip end" atomizing. Bijur Lubricating Corp., 151 W. Passaic St., Rochelle Park, N. J.

15. Band Saw. Flyer illustrates and describes the new Excel 3"x6" power metal cutting band saw, which incorporates the following features: adjustable hydraulic cutting feed control for infinitely variable blade feeds; automatic shut-off switch which stops motor upon completion of cut; adjustable vise that permits angular settings up to 45°. Covell Mfg. Co., Benton Harbor, Mich.



(See Number 7)



(See Number 8)



(See Number 9)

Free Literature

continued

16. Cleaning Barrels. Bulletin No. 705 describes the complete line of Pangborn heavy-duty Rotoblast barrels. Cut-away drawings and sketches show details of the wheel construction, along with special features. Illustrated case histories tell how the barrels are saving time and money at several different installations. Pangborn Corp., Hagerstown, Md.

17. Tape Controlled Positioning. Booklet describes advantages of this method, illustrates various applications. Claimed to reduce: setup time, tool change, jig or template cost, cycle time, scrap, operator fatigue, operator "required skill." Jones & Lamson Machine Co., Springfield, Vt.

18. Band Saws. Cover folder with eight separate insert sheets describes nine different ways to profit with horizontal metal cutting band saws and gives a thumb nail summary of every standard model in the manufacturer's line. Each insert sheet provides information on an individual model. W. F. Wells & Sons, Three Rivers, Mich.

19. Centrifugal and Rotary Pumps for a wide range of industrial uses are presented in 72-page catalog. Featured are open-impeller centrifugal pumps, in both the sealed and sealless types, and Roll-way mechanical positive-displacement ro-

tary pumps. Pioneer Pumps, Detroit Harvester Co., 21800 Greenfield Rd., Oak Park 37, Mich.

20. Diamond Wheels and Hones. Catalog furnishes current list prices on the manufacturer's various types and sizes, gives instructions for ordering diamond wheels and hones. Diacraft Inc., 26538 W. Seven Mile Rd., Detroit 40, Mich.

21. Carbide Drills. Bulletin No. 810 offers a series of tips about the most effective methods of gaining high production and long tool life from Hi-Roc solid carbide drills. A speed of 90 sfm is recommended for hardened steel, 150 sfm for annealed alloys to improve chip flow. M. A. Ford Mfg. Co., Davenport, Iowa.

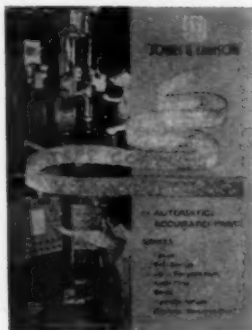
22. "The 'Hole' Issue on Holes" is a collection of pertinent information which explains how and why precision tapping, drilling and gun boring is being used to reduce the cost of ordinary metal cutting operations. Drillmation Co., Inc., 6500 E. Eleven Mile Rd., Center Line, Mich.

23. Separator Unit. Compact Magnaflo separator automatically removes ferrous solids from cutting oils and other soluble coolants. Self-cleaning, it delivers nearly dry sludge for easy disposal. Folder from U. S. Hoffman Machinery Corp., Dept. LR, Thompson Rd. Plant No. 1, Syracuse, N. Y.

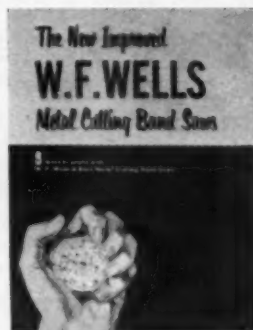
24. Oil By-Pass Relief Valves are introduced in 16-page catalog. Screw and flange-type valves for pipe systems from 1/4" to 3" and pressures to 500 psi are de-



(See Number 16)



(See Number 17)



(See Number 18)

tailed. Standard brass, cast iron, and all-steel valves are covered. Fulflo Specialties Co., Inc., 436 Fancy St., Blanchester, Ohio.

25. Metal Lathes. According to booklet new 10-inch lathe has a variable-speed drive and $\frac{3}{4}$ -inch collet capacity never before available on a metal lathe of this size. Designed to fill the need for a low-cost lathe to do heavy-duty work. Delta Power Tool Div., Rockwell Mfg. Co., 457 N. Lexington Ave., Pittsburgh 8, Pa.

26. Arbor Presses handle a wide variety of work, such as broaching, assembling, forming, molding, cutting with dies, straightening, burnishing, staking. Folder presents arbor and hydraulic presses, plus hydraulic sizing machine. Greenerd Arbor Press Co., 41 Crown St., Nashua, N. H.

27. Gaging Equipment. The Checkall L. H. 400 gage eliminates special gages to check grooves, tapers, concentricity, cross holes. Easily adapts from one application to another. Quality controls job at the machine to keep part scrap down. Booklet available from Hawkeye Specialty Co., 1532 W. 14th St., Davenport, Iowa.

28. Surface Plates and Stands. Bulletin "A" describes pink and gray granite surface plates ranging in size from 8 x 12 inches to 10 x 50 ft. A complete line of skeleton and cabinet type stands are available for all surface plate applications. Herman Stone Co., 1860 N. Gettysburg Ave., Dayton 27, Ohio.

29. Materials Handling Equipment. Folder discusses materials handling equipment

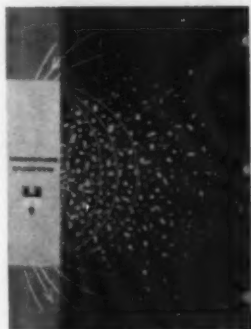
and conveyors, welding and fabricating, special machinery, contract manufacturing, and the Emco power punch press. Klaas Machine & Mfg. Co., 4314 E. 49th St., Cleveland 25, Ohio.

30. Air and Vacuum Pumps, gas boosters, and air motors are described in Catalog No. 359. Includes two and four vane types; fan-cooled, water-cooled and new radiator air-cooled models; motor driven units; direct-coupled and belt-driven models; integral pump and motor. Leiman Bros., Inc., 102 Christie St., Newark 5, N. J.

31. Metal Cleaning. "Your guide to Effective, Economical Metal Cleaning" is a series of charts in handy file-folder form. It simplifies the task of selecting the correct cleaning method and chemical for the various metals and soils which are likely to be encountered in the metal-working and finishing fields. Bulletin M240, Magnus Chemical Co., MTBB South Avenue, Garwood, N. J.

32. Air Cleaner. According to Bulletin 249A, the Rollotron is the only air filtration unit that offers the high efficiency of an electrostatic precipitator and the minimum maintenance of an automatic-renewing, disposable media air filter—both in one space-saving unit. American Air Filter Co., Inc., 215 Central Ave., Louisville 8, Ky.

33. Bin Vibrators. Pulsating-magnet electric vibrators keep stubborn bulk materials and bulk parts free flowing from bins, hoppers and chutes. Vibrators range



(See Number 23)



(See Number 24)



(See Number 25)

Free Literature

continued

from the diminutive 2-lb V-2 model, for vibrating materials of less than one cubic foot, to the 950-lb V-600, capable of vibrating bins with capacities weighing in excess of 150 tons. Syntroon Co., 300 Lexington Ave., Homer City, Pa.

34. Hex Socket Cap Screws. According to Bulletin G-25, "60 Series" larger head diameter cap screws give up to 2-1/3 times more load-carrying capacity without indentation. They conform to standards recently adopted by Socket Screw Mfrs. Technical Committee. Allen Mfg. Co., Hartford 1, Conn.

35. Sprockets and Chain Drives. Catalog No. 60 contains 88 pages of information on 1300 different stock sprockets and various types of roller chains. Cullman Wheel Co., 1344 Altgeld St., Chicago 14, Ill.

36. Power Saw. Brochure describes and illustrates the cut-off capacity and operating ease of the Model C-24 power saw. Features: chip disposal system; redesigned saw feed control mechanism, which increases blade life 200 to 500 percent; improved drive system, to supply adequate power for new accessories, and a new coolant system. DoAll Co., Des Plaines, Ill.

37. "Dimensional Standards for Semi-Tubular Rivets" contains standards data on all major classes of semi-tubular rivets.

It includes, in chart form, such information as body and head diameters, head thicknesses and radii, and hole diameter and depth figures. Tubular and Split Rivet Council, 53 Park Pl., New York.

38. End Mills. Several new styles and sizes of heavy duty, ball, and other types of end mills are presented for the first time in a new catalog from Arrow Tool & Reamer Co., 711 Stephenson Highway, Troy, Mich.

39. Carbide Cutters. Catalog states that Quality Tool Works, 760 Market St., Waukegan, Ill., is making available, from stock, a complete line of carbide Woodruff keyseat cutters in the more popular sizes, from 1/2" to 1 1/2" diameter. Cutters have hardened hss bodies to provide adequate support for the carbide tips.

40. Drills, Counterbores, Countersinks. New 68-page catalog devotes 44 pages to engineering data—the latest information available on drills and drilling procedures. Gives information on drill reconditioning, drilling speeds and feeds, jig drilling and drilling of difficult to machine materials. Cogsdill Twist Drill Co., Inc., Greenfield, Mass.

41. "Keys to Bearing Fits" contains instructions for preventing premature bearing failures and off-schedule removal, procedure for obtaining accurate bearing fits easily and economically, and engineering data claimed to assure perfect bearing fits on all anti-friction bearings. Bearing Inspection, Inc., 3311 E. Gage Ave., Huntington Pk., Calif.



(See Number 34)



(See Number 35)



(See Number 36)

IDAA Elects Officers

The Industrial Diamond Association of America, Inc., Pompton Plains, N.J., at its 14th Annual Meeting and Convention May 11-14 in Williamsburg, Va., elected the following officers to serve for the coming year: as president, **Donald J. Wallace**, Wheel Trueing Tool Co., Detroit; as first vice-president, **Bernard Jolis**, U. S. Industrial Diamond Corp., New York; as second vice-president, **Leopold H. Metzger**, Super-Cut, Inc., Chicago.

Directors elected for the following two years are: **Charles Baumgold**, Diamond Tool Research Co., Inc., New York; **Donn E. Stone**, J. K. Smit & Sons of Mich., Inc., Grosse Ile, Mich.; **Jan Taeyaerts**, Precision Diamond Tool Co., Elgin, Ill.; **John Van Itallie**, The Van Itallie Corp., New York. The outgoing president, **Morris Winston**, Diamond Drill Carbon Co., New York, will also serve as director for the coming year.

Bliss and Henschel Form West German Corporation

The E. W. Bliss Co., of Canton, Ohio, and Henschel-Werke, GMBH, of Kassel, West Germany, have completed an agreement for a joint venture in Westerman Germany. Bliss and Henschel have formed a new corporation, Bliss-Henschel, with Bliss holding a 75% interest and Henschel the remaining 25%.

Located at Dusseldorf, Bliss-Henschel will market complete lines of Bliss rolling mills and allied equipment, mechanical and hydraulic presses, container making machinery and other manufacturing equipment. All manufacturing



Robert Potter, president of **E. W. Bliss Co.**, (left), and **Dr. Fritz-Aurel Goergen**, co-owner and president of **Henschel-Werke, GMBH**, are shown during Dr. Goergen's recent tour of the Salem, Ohio, plant of the Bliss rolling mill division.

will be done by Henschel-Werke in their three integrated plants, located at Kassel, 150 miles from Dusseldorf.

Rockford Machine Tool Co. Buys Two Chicago Firms

Rockford Machine Tool Co., Rockford, Ill., has announced the acquisition of **Maplewood Machinery Co.**, Chicago, manufacturer of roll forming equipment, and the **Engels Elbow Machine Corp.**, Chicago, manufacturer of power and hand tools for sheet metal work. All manufacturing activities will be moved to Rockford and operated as the **Maplewood Division** of the Rockford Machine Tool Co.

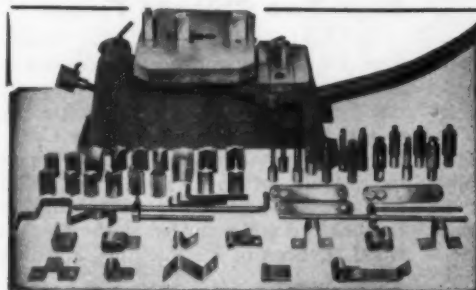
Industrial Supplies and Machinery New Order Index



The March new order index for industrial supplies and machinery matched the all-time high of 221 (July 1948=100) set in January 1957, reports the American Supply & Machinery Manufacturers' Association, Cleveland. The seasonally adjusted index jumped 19 points, or 9.4 percent, over February's reading. It reflects new orders for production tools, equipment, and supplies placed by industrial distributors with their manufacturing sources. March's increase was the biggest monthly rise since the seasonally ad-

justed index hit bottom at 148 in April 1958.

The gain in the ASMMMA new order index paralleled the upward movement of the industrial production manufactures durable index, seasonally adjusted, of the Federal Reserve Board (as shown by broken line on chart above). In March the FRB index registered 160 (1947-49=100). It has climbed 27 points from its April low, but is still 6 points below its December 1956 high.



Multiform BENDER CUTTER

CUTS, BENDS, PUNCHES

Available in hand, air and hydraulic models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend, and cut round or flat brass, bronze, aluminum, steel, etc., up to $\frac{1}{8}$ " x $1\frac{1}{2}$ " as illustrated, other models up to $\frac{1}{2}$ " x 8".

J. A. RICHARDS CO.
KALAMAZOO, MICH.

Vermont Tap & Die Co. Buys Pacific Tap of Burbank

The Vermont Tap and Die Co., Lyndonville, Vt., a subsidiary of American Saw and Tool Co., Louisville, Ky., has purchased Pacific Tap Co. of Burbank, Calif., to be operated as a division of Vermont Tap and Die. The purchase is expected to facilitate expansion of the product market for both divisions in 11 western states.


The principal products of the newly

acquired Pacific Division are taps, dies and associated tools used in aircraft manufacturing, metalworking and the building trades. Engineering, manufacturing, and quality control facilities of the parent company now will be utilized by Pacific Tap to step up quality and service to its customers.

Richard F. Sanford has been appointed district sales manager for the 11-state area. He was formerly a sales engineer for Vermont in southern California.

Complete DRILLING

versatility



for the
"cumbersome" parts...
with U. S. DRILL HEADS

Lots of cost-reducing features: Full ball bearing mounting... Shaved gears... Exclusive quick-change neoprene-sealed universal joints... Heavy duty spindles... Adjustable-arm or special bored Slip Spindle Plates.

Is your drilling *accurate and economical* in structural steel, tube sheets, flue sheets, and other large cumbersome parts? Universal Joint Adjustable U. S. Drill Heads with Air Counterbalance and 360° Ball Bearing Swivel Attachment add versatility to radial drills.

Select the *right* head for your jobs from the many sizes of Style U Heads.



Adjustable and Fixed Center Multiple Drilling Heads.
Individual Lead Screw Multiple Tapping Heads.

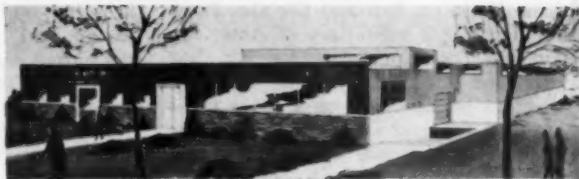
UNITED STATES DRILL HEAD CO.

BURNS STREET • CINCINNATI 4, OHIO

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A.I.T. Diamond Tool Co. Builds New Plant

A spacious plant is being constructed adjoining A.I.T. Diamond Tool Co. facilities at Skokie, Ill. The new building, which will triple present capacity, shall be known as Plant No. 2. It will




New plant will triple present capacity.

house the research and development division, additional production facilities, new executive offices, and a large demonstration and schooling section—the "Dia-Mo-Rama" room.

In this room, various types of grinders, both conventional and electrically assisted, will be in readiness for visitors who want knowledge and information on new applications. The schooling and demonstration programs will be of interest to metal cutting, ceramic, stone, optical and glass industries seeking new methods. This service is claimed to be the first of its kind in the Midwest.

HOLES

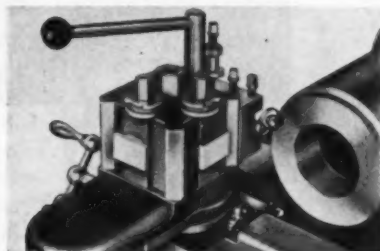
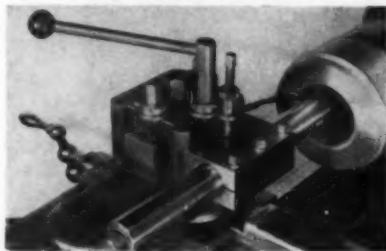


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FAST DRILLING
IN DEEP HOLES

Clark "SPADE DRILL"

P. O. BOX 990 BEVERLY HILLS, CALIF.

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**BETTER WORK!
FASTER WORK!**

BONI

**A TREMENDOUS
TIME SAVER**

The BONI Universal Lathe Tool Holder, A MUST!

The Reason?

- Fast Change of an UNLIMITED AMOUNT of Tools on the Tool Post
- ACCURATE REPOSITIONING of the Cutting Points Within .0001"
- RIGIDITY Permits Oversize Boring Bars, Cutting Tools

HERE IS HOW YOU CAN DEFINITELY INCREASE YOUR PROFITS!

NEISE
MODERN TOOLS

KARL A. NEISE

Dept. MT-79, 404 4th Ave.
New York 16, New York

Use postpaid card. Circle No. 292

Besly-Welles Opens New Los Angeles Branch

Opening of a new combination branch office and warehouse at 3224 Union Pacific Ave., Los Angeles, has been announced by Besly-Welles Corp., South Beloit, Ill.

The new facilities contain 4000 sq ft of floor space to stock the company's cutting tools and gages for West Coast distributors.



Combination branch office and warehouse

M-B PNEUMATIC GRINDERS



Model M-CR-B



Model U-TR



Model HD-CR

Outstanding, powerful, fast-cutting tools of proven high efficiency. Designed for tough jobs and real production. Perform indefinitely and dependably. Precision made. Steel housing for safety. Also other models.

WRITE FOR LITERATURE

M-B PRODUCTS
46 VICTOR AVE., Div. 22
DETROIT 3, MICHIGAN

Use postpaid card. Circle No. 293

R. B. Tool Co. Moves

R. B. Tool Co., Inc., manufacturer of boring bars and tool holders, has recently announced its move from Palisades Park, N.J., to a more suitable location at 340 Maple Ave., Westbury, L. I., N. Y.

Disston's Danville, Va. Plant Under Construction

H. K. Porter Co., Inc. has announced that 90 acres outside of Danville, Va. will be the site of a new \$1,200,000 plant for the Disston Division. The plant, a one-story steel and masonry structure affording 155,000 sq ft of floor space, will be constructed by the Danville Area Development Foundation and leased to Porter on a 25-year basis. Porter has purchased 70 acres adjoining the plant site for possible further expansion. Facilities are expected to be completed early in September 1959.

MASTERCRAFT TOOLS

ORIGINALLY F & M SALES CO.

Since 1937 a versatile tool for numerous jobs on the drill press. 7" rectangular table.

MODEL 500

MASTERCRAFT ENGINEERING CO.

P.O. BOX 193-B ARLINGTON, CALIF.

Use postpaid card. Circle No. 294

Over 500 persons will be employed at the new plant. Administrative offices will remain in Philadelphia, as will part of the industrial tool production facilities.

Obituaries

Paul A. Montanus

Paul A. Montanus, 76, president of The Springfield Machine Tool Co. since 1947, died at Springfield, Ohio, on April 21. He joined the company in 1906 as vice-president and general manager.

The company was established in 1887 by Mr. Montanus' father, Philip E. Montanus.

Byron F. Bower

Byron Frank Bower, president of Pines Engineering Co., Inc., Aurora, Ill., died in his sleep May 5, 1959. He was 63 years old.

Mr. Bower founded the tube fabricating equipment company in 1941. Besides applying himself energetically to his business, he maintained a keen and active interest in politics and civic affairs. As a member of the Illinois Manufacturing Association, he took an active part in committee work. Other organizations of which he was a member were National Association of Manufacturers, Illinois State Chamber of Commerce, United States Chamber of Commerce, American Society of Tool Engineers.



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Templates

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Appointments and Promotions

Personnel Changes . . . Executive and Production



H. L. Spaunburg, Jr.



Charles Peterson



H. G. Bixby



R. E. Mack, Jr.

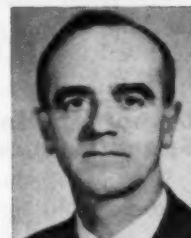
The Hartford Special Machinery Co., Hartford, Conn., has announced the appointment of **Harvey L. Spaunburg, Jr.** as vice-president of manufacturing and **Francis A. Carr** as factory manager. . . . **Clifford J. Warden** of Dexco Corp., Detroit, was elevated to vice-president and factory manager at a recent meeting of stockholders. . . . The G. A. Gray Co., Cincinnati, has announced that **August Marx**, in becoming chairman of the board, has relinquished his duties as chief executive officer to **Graham E. Marx**, who was recently elected president and general manager. . . . **Charles Peterson** has been appointed chief engineer at Veet Industries, East Detroit, Mich. . . . **H. Glen Bixby** was recently elected president of Bryant Chucking Grinder Co., Springfield, Vt. His election followed the resignation of former president **J. H. Beardsley**. **N. A. Leyds** was elected to the office of vice president and general manager. . . . **Frank L. Bailey** and **E. Lawrence Brevik** have joined hands to form a new company in the Los Angeles area—Chemical Milling International Corp. Bailey is president and sales manager, and Brevik is technical director. A third principal in the new firm is **Robert Vulcan**, who will act as administrator, supervising all business and financial matters for the company.



F. A. Carr



G. E. Marx



N. A. Leyds



R. A. Bode

Personnel Changes . Sales and Service

Robert A. Bode was recently appointed vice-president of sales at Hartford Special Machinery Co., Hartford, Conn. . . . **Raymond E. Mack, Jr.**, has left the Edwin J. Montalvo Co., New York, for Fawick Corp., Cleveland, where he is employed as sales manager, Airflex Division. . . . Narda Ultrasonics Corp., Westbury, N.Y., has opened New York State and Midwest regional factory sales

and service offices. **Herbert A. Frankel** was appointed New York State regional sales manager. His headquarters will remain at the plant in Westbury. **Marvin Klein** has been named Midwest regional sales manager to head the company's

branch office at Chicago. . . **Burleigh L. Owens** has been named manager of industrial sales for the Atkins Saw Div., Borg-Warner Corp. Owens has been employed by the Indianapolis saw firm for the past 38 years.

New Dealers and Distributors

Company	Address	Distributor for
Tornquist Machinery Co.	864 Burlway Road	Hamilton Tool Co.
Welles Supply Co., Inc.	Burlingame, Calif.	Hamilton, Ohio
	111 E. 14th St.	Adamas Carbide Corp.
	Elmira Heights, N.Y.	Kenilworth, N.J.

Films and Books

Cutting and Grinding Fluid

"The Necessary Nuisance" is the title of a thirty-six minute color film available. The educational film explains the role of modern coolants in cutting and grinding procedures. It answers many of the questions encountered in machining with modern day cutting and grinding fluids.

For information on a showing of the film in your plant, write Master Chemical Corp., 13 Huron St., Toledo 1, Ohio.

Demonstration Movie on Speed Reducer and Tapper

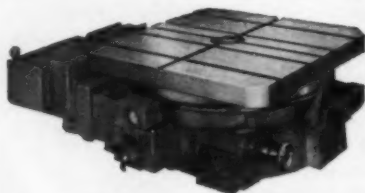
Supreme Products Corp. has just prepared a 16 mm color movie that

demonstrates the use of its two power drill attachments—the Versamatic and the push-pull tapper.

The Versamatic is a reversible speed reducer for 1/4" portable drills used for heavy duty screw driving and removing, for nut running, on or off, and for powering heavy duty cutting tools as masonry bits, fly cutters, hole saws.

The push-pull tapper is an attachment similar to the reducer, but made for the single purpose of driving and removing taps. The attachment handles all taps up to 5/16" diameter.

Showings of the 6-minute film are free. Firms planning general engineering or maintenance meetings will find it of interest. The firm will arrange to have a factory man on hand to



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You save set-up and positioning time with Gilbert rotary tables. *Hand-indexing:* 36" and 50" square or round. *Power rotary and power feed:* 36", 50", 60", and 72" square or round. Special tables built to your requirements. For complete descriptions and specifications, write for Bulletin 854.

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answer questions and give additional information when required.

Available through Supreme industrial distributors or by writing direct to Supreme Products Corp., 2222 S. Calumet Ave., Chicago 16, Ill.

Methods of Thread Rolling

A 16 M/M film in color, with sound, on the Landis Lanhyrol thread rolling machine is available by contacting

the Advertising Department of the Landis Machine Co., Waynesboro, Pa.

Of 20 minute duration, the film explains in detail with illustrations and narration the three methods of rolling ("Infeed," "Continuous," "Thrufeed") by which the machine can be used for thread gear rolling.

Additionally, it shows nine applications rolling as many different workpieces to illustrate the utility value and versatility of the machine.

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POWDER METALLURGY IN NUCLEAR ENGINEERING. Available from the American Society for Metals, Technical and Engineering Book Dept., 7301 Euclid Ave., Cleveland 3, Ohio.

\$8.50

This thoroughly illustrated volume should prove of major reference value to engineers and students of this advanced stage of metals technology. The book was assembled under direction of Dr. Henry H. Hausner, well-known consultant to Sylvania-Corning Nuclear Corp. Most of the work and findings described were under U. S. Atomic Energy Commission sponsorship.

Fifteen chapters range from general metallurgical problems in the design of nuclear reactors through the safe handling of pyrophoric and radioactive metal powders. Powder metallurgy of zirconium, uranium, thorium, beryl-

lium and various alloys are discussed, as are metal powders, preparation for reactors, ceramic fuel materials and related topics.

AMERICAN STANDARD B5.30-1958—KNURLING. Approved by the American Standards Association, 70 E. 45th St., New York 17, and published by the American Society of Mechanical Engineers, 29 W. 39th St., New York 18.

\$1.50

This revision of *American Standard B5.30—Knurling* includes tooth depths for diagonal knurls, and various editorial changes have been made for the sake of greater clarity. The previous version was published in 1953. Joint sponsors of the project are the American Society of Tool Engineers, the Metal Cutting Tool Institute, the National Tool Builders Association, the

Beverly THROATLESS SHEAR

Cut any Shape... **STRAIGHT OR IRREGULAR**



B-3 with Ball Bearing Hold Down

Make any cut — curved, straight or irregular, faster, easier and better with less material waste on a Beverly Throatless Shear. You can turn work to any position

and make a clean cut as you go. Handles heavy gauges with ease—lighter metals without distortion. 4 models — capacities 18 gauge to 3/16" mild. All shears equipped with H.C. H. C. Blades for cutting Stainless.

INSIDE SLOTTER

8" Reach — 16 ga. cop.

Makes inside slotting cutting faster, easier, cleaner. Punch and die arrangement of 5 blades assures accuracy, clean cutting action. Cuts 2 1/2"x1/4" slot at one stroke. Throat design permits pivoting work at any point in stroke for special inside cuts. Note sample cuts.

See your Beverly Dealer or write for illustrated catalog.



INSIDE

BEVERLY SHEAR MFG. CO., 3005 W. 111th St., Chicago 43, Ill.

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Society of Automotive Engineers, and ASME.

The standard covers knurling tools with standardized diametral pitches. It includes dimensional relations with stock in the production of straight, diagonal and diamond knurling on cylindrical surfaces which have teeth of uniform pitch parallel to the axis of the cylinder or at a helix angle not

exceeding 45 degrees with the axis of work.

The purpose of the standardized method is to improve the appearance of knurling, to make knurls more uniform, to eliminate costly trial and error methods, to reduce the failure of knurling tools and the amount of defective work, and to decrease the number of tools required. • • •



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Copy Nibbling Machine Works Directly from Template

The Trumpf copy nibbling machine reproduces blanks or cut-outs of any shape directly from a master or template. It will also perform shearing, beading, folding, peening and slotting operations.

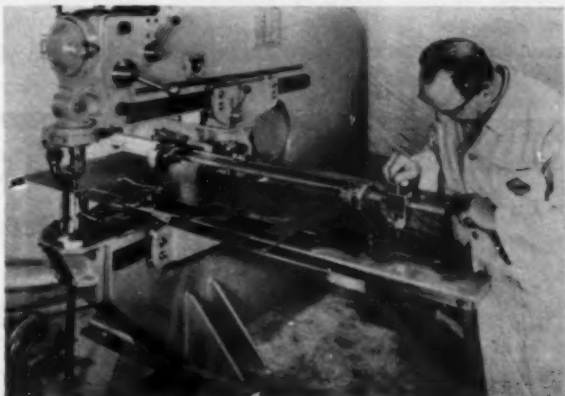
The sheet does not require holding by the operator; it does not have to be turned about to meet the cutting edge of the punch, and it does not have to be hand-fed through the cutting tool according to a pre-drawn contour. Instead, it is rigidly clamped to roller bearing guided co-ordinates which permit it to be moved effortlessly in any horizontal direction by guiding a tracer pin along the contours of the template. Separate punching or drilling of the sheet is also eliminated since the all-side cutting punch is designed to pierce the starting hole.

Rectangular cut-outs do not require a master but are positioned directly by built-in rulers. Circular cuts from $\frac{3}{4}$ " to 24" diameter can be produced by clamping the tracer guiding pin into a revolving, adjustable ruler. This also eliminates the need for a centering hole.

Nibblers are available with throat depths of 41", 49" and 59" respectively. They have a cutting capacity of up to 9 gauge steel material of 70,000 lb/sq in. tensile strength.

Cosa Corp., 405 Lexington Ave., New York 17, N.Y.

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Operator guides tracer pin along contours of template.

Form and Punch Shaper

The K-150 form and punch shaper now employs a larger dividing head



with automatic circular feed. The machine makes irregular-shaped stamping and electrode punches, accurate to $\pm .00025$ ".

Punches need no further machining operations when completed on the shaper. Operations in the process can be checked with a special built-in 30 power microscope.

Jersey Mfg. Co., 436 Livingston St., Elizabeth 1, N.J.

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Portable 3-in-1 Band Saw

The Arrow portable band saw can be quickly set in horizontal, vertical or angle positions without the use of tools. It is suitable for the following applications: small metal fabricating, machine and welding shops; plant maintenance; school and vocational training shops.

Cut-off head moves to mark. Blade pressure may be changed in seconds. Guides turn a full 90°. The machine is convenient for notching, sawing circles,

A TALE OF TWO CHIPS

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Do you get more holes per minute • longer drill life • closer tolerance holes • less operator fatigue?

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Dept. 5, 570 Pleasant St., Watertown, Mass.

***Black Diamond Saw & Machine Works, Inc.**

Rattick, Mass.—Manufacturers of Black Diamond and Worchester Drill Grinders.



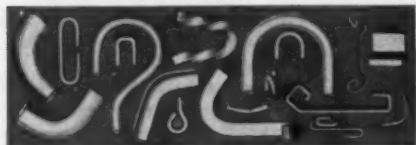
BLACK DIAMOND DRILL GRINDERS:
For #70 drills up to 3/4" (illus.)

WORCESTER DRILL GRINDERS:
For 3/4" drills up to 2 1/2"

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give tubing, pipe, structural shapes and solids the contour you need for the use intended. That is why production men have been bringing bending problems to Wallace since 1896. It is the time-proved way to bend a production curve upward and a cost curve down.



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serve outstanding metal fabricators the world over, many of them exclusively. The complete Wallace line includes ram benders, rotary and roll benders, automatic and manually operated, in the widest range available. For the job you do, Wallace builds the bender.

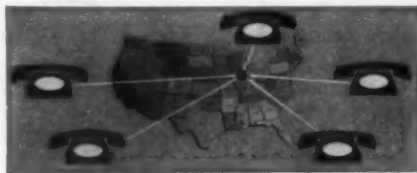


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or straight ripping of long material. No lubrication is required for cutting. All wheel and guide bearings are sealed ball bearing type. The blade takes only seconds to replace.

Arrow Saw Corp., 702 E. Main St., Madison, Wis.

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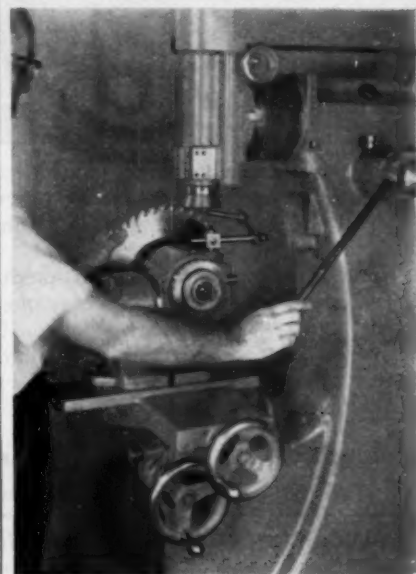
Grinding Machine for Circular Saws

The Oliver ACE grinding machine is designed for use in wood and metal-working plants using circular saws. They can now do their own sharpening on a machine simple to set up and use.

The machine can sharpen carbide tipped and high-speed steel circular saws and other wood cutting tools. Face mills, reamers, hobs, spot facers, straight and spiral cutters and general purpose tools can also be sharpened by the machine.

Oliver Instrument Co., 1442 E. Maumee St., Adrian, Mich.

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Sharpens circular saws; other wood cutting tools.

Stops Small Drill Breakage

This precision tool is said to make small hole drilling simpler, faster and more economical. It may be used on milling machines, jig borers, lathes,



Drilling pressure is controlled with finger tips.

and drill presses. After locking into position, drilling pressure is controlled with the finger tips.

The small hole driller is claimed to practically stop drill breakage. Drills stay sharp up to 400% longer because the operator "feels" the correct cutting pressure.

Hunter Tool, P.O. Box 564, Whittier, Calif.

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JULY, 1959

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Duplicator Tables

2 or 3 Dimensional
**FLUID
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Fastest Profile Milling and Duplicating

Save up to 50% and more machining time on contoured parts with both the R-200 and R-300 models. Single-lever control allows operators to duplicate complex parts in a fraction of the usual time.

R-200 — 2-Dimensional Profiler for any vertical miller

R-300 — 2- and 3- Dimensional for Bridgeport millers

Capacity: 6" x 6" (7" x 6" Special)
1 to 1 ratio with master

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J. M. KALINS & COMPANY

1575 Railroad Ave., Bridgeport, Conn.

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153

Titanium Carbide Tool Bits Perfected by Ford Motor Co.

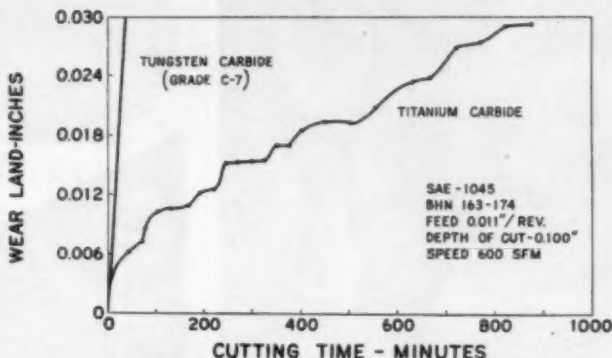
Titanium carbide tool bits that are claimed to outwear tungsten carbide grades for semi-finish and finish machining have been perfected by the metallurgy department of Ford Motor Company's scientific laboratory. Dr. Michael Ference, Jr., director of the laboratory, classes these tools as "probably the most successful cermet to be produced since the development of tungsten carbides" in the tool and die grades. (The term "cermet" is a contraction and combination of the words "ceramic" and "metal.")

"We have no plans at present for offering the new tool bits for sale outside the company," Dr. Ference said. "However, we are exploring the possibility of licenses with other companies that might desire to begin commercial production of titanium carbides."

Ford metallurgists used a combina-

TOOL PERFORMANCE COMPARISON

SCIENTIFIC LABORATORY TITANIUM CARBIDE
VS.
COMMERCIAL TUNGSTEN CARBIDE



A standard machinability test produced this dramatic result when a regular C-7 tungsten carbide tool bit was matched against the new titanium carbide bit. The C-7 cut approximately 85 lb. of metal and lasted 37 minutes before attaining a wear land of 0.030", while Ford's titanium carbide cut more than 2000 lb. and lasted 890 min.

tion nickel and molybdenum as the bonding agent for the titanium carbide. The end result contains about 80 percent titanium carbide, with nickel and molybdenum making up the remaining 20 percent.

Engineering & Research Staff, Ford Motor Co., Dearborn, Mich.

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Plain Type **CONTINUOUS HINGES** Offset Type

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Open width 7/8" to 6"

Gage Material .040 to .125

Pin Diameter .101 to 3/8"

Lengths to 120"

SPECIFICATIONS

Easy Reading Vernier Caliper

The No. 17 Etalon (Swiss) caliper has flush back jaws and extra long fully adjustable vernier plates. The caliper is dull chrome plated and will not chip or peel. It is claimed to be exceptionally easy to read. Inside, outside and depth measurements are read from the same scale. Caliper is available in English or English and Metric combination. It is packaged in a handsome contour case.

Alina Corp., 122 E. 2nd St., Mineola, L.I., N.Y.

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No. 17 Etalon Caliper has flush back jaws, extra long adjustable vernier plates.

One of these Wilson "Rockwell" instruments will do your hardness testing job

No matter what your hardness testing requirements are, there's a Wilson "Rockwell" tester to do the job. Choose from this complete selection of hardness testing equipment:

"Rockwell" Hardness Tester—for most hardness testing functions.

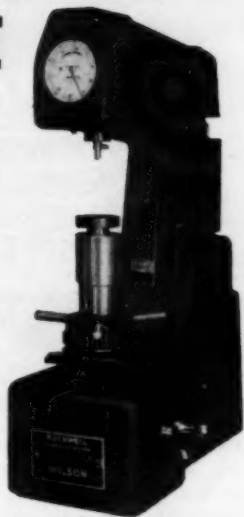
"Rockwell" Superficial Tester—for extremely shallow indentations.

TwinTester—Combines functions of "Rockwell" and "Rockwell" Superficial testers.

Semi and Fully Automatic—for high-speed testing, at rates up to 1,000 pieces per hour. Automatically classifies pieces as CORRECT, TOO HARD, or TOO SOFT.

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 And Kwik-Change Nozzle With Guard.



For drilling, tapping, milling, sawing, grinding, etc. Removes heat from cutting edges of tools and work. Feeds can be increased considerably, finer finishes and accuracy are obtained. TRICO-MIST absorbs heat, thereby quenching it faster than flood coolants which only transfer it. Chips slide freely up the tool face and are blown away automatically. Simple needle valve controls size and volume of mist spray. Attaches to shop air line. Available with one and five gallon containers — single or multiple outlets — single or dual valve control.

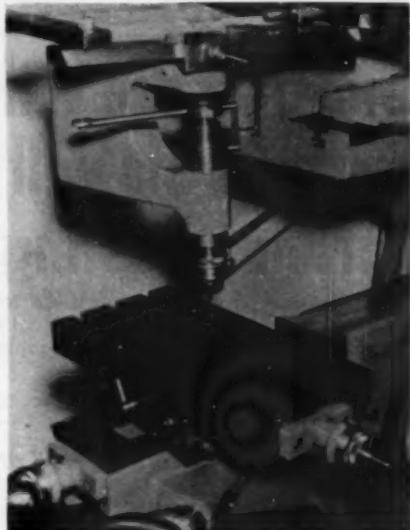
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TRICO FUSE MFG. CO.
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**Drill Attachment Designed
 for Use on Engraver**

A drill attachment for the Model 2D-4 Panto engraver enables the operator to drill any number of holes from an accurate master template. The extension drop lever provides for a maximum vertical spindle travel of 15/32", with a positive stop for depth control.



Operator drills from master template.

Two precision drill chucks are available to hold drills from .008" to .0625" diameter or from .025" to .125" diameter in addition to the standard split collets.

With a choice of six cutter spindle speeds ranging from 5000 to 14,000 rpm and with pantograph reduction ratios from 1:1 to infinity, the engraver with drill attachment is particularly useful for drilling printed circuit units used extensively in electrical and electronic products and for drilling, engraving and profiling in carbon, plastic and metal.

H. P. Preis Engraving Machine Co.,
 242 Industrial Branch, U.S. Highway
 22, Hillside, N.J.

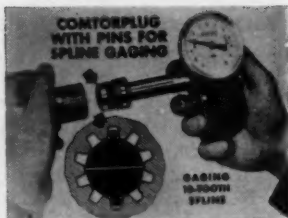
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MACHINE and TOOL BLUE BOOK

Gage Checks Spline Dimension

By the addition of gage wires to its expanding plug for cylindrical holes, Comtorplug now provides a gage for directly checking the "between pins" dimension of splines and internal gears. Gage may be designed for either odd-tooth or even-tooth work. The dial provides a fixed reading of the dimension, with .0001" graduations. Gages are applicable to work having between-pins dimensions from $\frac{3}{8}$ " to 10". Comtor Co., Waltham, Mass.

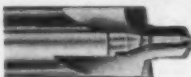
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Gage may be designed for odd- or even-tooth work.

IMMEDIATE DELIVERY OF CONTOUR CUTTERS For Standard Hydraulic Fittings... *In Stock*

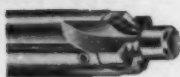
AND 10050 Port Cutters



Turret Lathe and Drill Press Series: Carbide Tipped, integral reamer



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MS 33514: Carbide Tipped integral end pilot



MS 16142 "SAE": Carbide Tipped interchangeable end pilot and reamer

External Flat Form Tools



MS 33656 E and G; MS 33657 E and S Stocked in Carbide Tip and H.S.S.



MS 33514E; MS 33515E and S Stocked in Carbide Tip and H.S.S.

Wetmore stocks the fullest line of Port Contour Cutters and Flat Form Tools for Standard Hydraulic Fittings to assure fast delivery. Where required, modification of standard contours can usually be made within 48 hours.

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Non-impact and non-surge hydraulic force is maintained throughout the complete power stroke and can be regulated from full force down to 50% of its

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SURFACE PYROMETER

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PYROMETER INSTRUMENT CO., INC.

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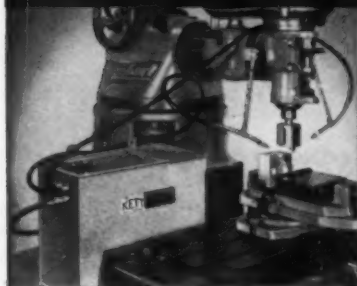
Hydraulic power for press operation; shop air pressure for speed

rating. Speed of the power stroke can be regulated from a creep to over 3000 strokes per hour.

The units are available with optional

WHATEVER YOUR DRY MACHINING PROCESS—

Economical KETT "Mystic-Lube" Mist Coolant Generator



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- Dependability

Mist dissipates in the air—cools by refrigeration principle. No special coolants, no moving parts—operates off any air line. Compact, all-in-one unit, one and four gallon size, has features non-available in many higher priced models. Quality designed for quick transfer, ease of maintenance.

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floor stands. Controls furnished may be dual safety hand lever, dual electric push button, automatic reverse on pressure or distance, and full automatic cycle.

Jackson Fluid Power Co., 16722 E. Warren Ave., Detroit.

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Machinist's Vise

Engineered for rugged bench work, the new machinist's Speed-Vise employs quick acting screw principle. The

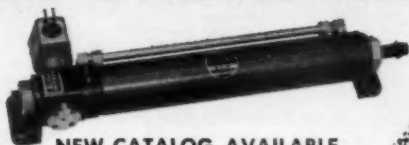


Life, slide, lock action places piece in vise.



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BEACH...**

**BUT WHAT DO YOU KNOW ABOUT
AIR CYLINDERS?**



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screw cannot slip while the nut is in positive clamp position, but will release instantly with a half turn.

On placing a piece in the vise, the screw is loosened by a half turn and the jaw is free to slide to the full opening. The jaw is then pushed up to the piece, dropped into place and locked with a half turn.

Cardinal Machine Co., 1819 Dana Street, Glendale, Calif.

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Automatics' Guide Bushing Improved by Helical Slots

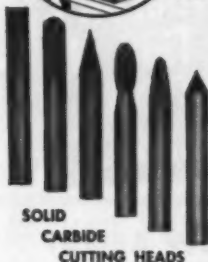
A carbide guide bushing for Swiss automatic screw machines features helical rather than straight slots, virtually eliminating seizing of the bar stock, the manufacturer reports. This type of construction permits the lubricant to reach the bar stock more quickly, provides complete lubrication of the bar turning



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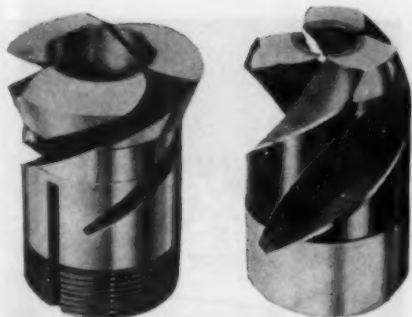
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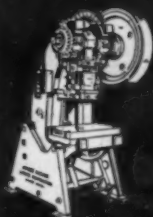


in the bushing. Increased production speed of the machine is also claimed.

The bushing is available in both drawn and push types. Tolerances are based on standards of the Swiss Society of Machine Tool Builders, insuring interchangeability of various pieces.

Continental Precision Corp., 487 Broadway, New York 13, N.Y., national representative for Neukomm S. A., Switzerland.

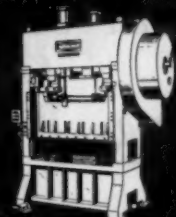
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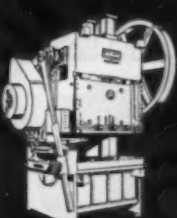
15 models
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150 ton

INCLINABLE

6 models in
single crank
from 75 to
250 ton.
8 models in
double crank
from 40 to
200 ton



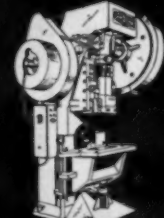
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6 models
from 60 to
200 ton

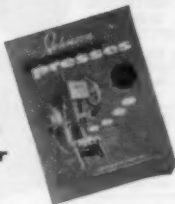
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35 and
60 ton
models



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Special
presses
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order



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catalog we have charted
the information you want on the
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Johnson

POWER PRESSES

Johnson Machine & Press Corp., Division Bontrager Corp.
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Compact Lapping Machine Has Big Machine Operation

The bench model Gyro-Matic 12" flat lapping machine operates with Spitfire's exclusive work holder retainer rings to give the high tolerance output of larger lapping machines. These rings reportedly permit a constant rotating movement which produces a truing action to keep the lapping surface completely flat.

Pushbutton operation automatically controls most details while eliminating

Most Drilling Per Dollar! *Veet* 3 foot RADIAL



Features Found Only In Highest Priced Radials

Finger-Tip Clutching
Automatic Drill Ejector
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Centralized Controls

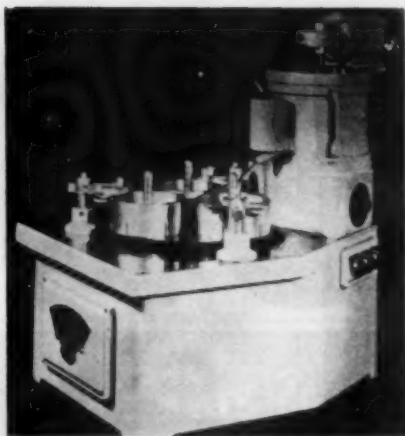
Hardened Column & Way Inserts
Automatic Depth Control
Timken Bearing Column & Spindle
Head Glides on Ball Bearing Rollers

Refer to Sweet's Machine Tool File or Hitchcock's Machine Tool Cyclopedic, 1939 editions, for our catalog.

Send for Brochure of *Veet*'s 16 Points of superiority and name of nearest dealer, who will arrange actual demonstration of the *Veet* Radial, in your plant, without obligation.

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parts measurement and testing.

A selector allows easy selection for correct abrasive flow. A new design feed line is said to assure positive flow of the abrasive to working area.

Spitfire Tool & Machine Co., 2931 N. Pulaski Rd., Chicago 41, Ill.

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WITH INTERCHANGEABLE
DIAL TEMPLATES AND OCULARS



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for U.S. National
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A moderately
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MEASURING
TOOL
for Toolroom
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MACHINE and TOOL BLUE BOOK

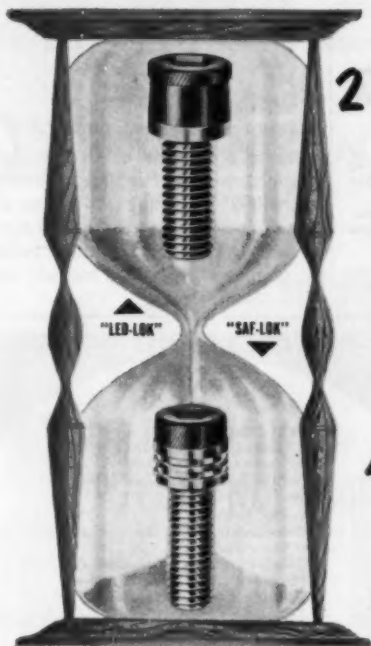
Bottoming Bar Has Floating Cutter

Bottoming bar finishes walls and bottoms of holes to close tolerances with excellent finishes. It is not designed for full bottoming since, in expanded position, a small gap exists between the two cutter blades. But it will square off internal shoulders, clean up bottoms almost to center. Cutters have an adjustment allowing up to .300" expansion. A floating mount permits lateral movement of the cutters. Robt. H. Clark Co., Beverly Hills, Calif.

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Chip load is equalized on each cutting lip; blades center themselves to the bore.



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LED-LOK® SOCKET SCREWS positively will not loosen under any vibration. They're also air-, water-, gas- and oil-tight.

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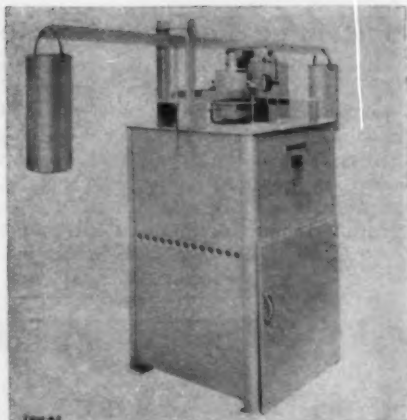
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Coke/Ore Testing Furnaces With Temp. to 3000° F.

The Model G-2716-OTS coke or ore testing furnace determines the compression strength of coke and ore pellets at high temperatures. Over-all dimensions are 28" long x 25" wide x 55" high.

A hollow silicon carbide tube is the heating source. An automatic indicating or recording pyrometer is used to control and determine the temperature. The



Determines compression strength of coke or ore. Sample of coke or ore is placed within the tube. The furnace is then brought up to 3000° F, under a nitrogen atmosphere, and increasing pressure is applied to the sample through a counterbalanced pressure rod until the sample collapses.

JIG GRINDING and JIG BORING

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92

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Adjustable short-run drill jig
Self-centering air vise
Combination tapping/deburring tool

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Ball-turning tool for concave and convex radii
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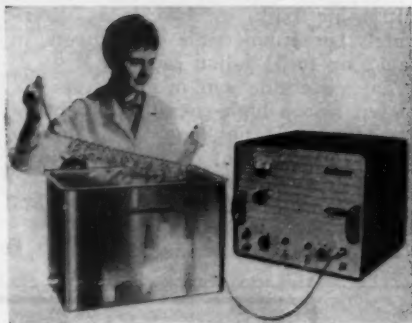
Results of tests run in the furnace will determine the coke that will best support a heavy burden and allow for a free passage of air through the furnace charge.

Hevi-Duty Electric Co., Milwaukee 1, Wis.

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Ultrasonic Cleaner For Large-Volume Cleaning

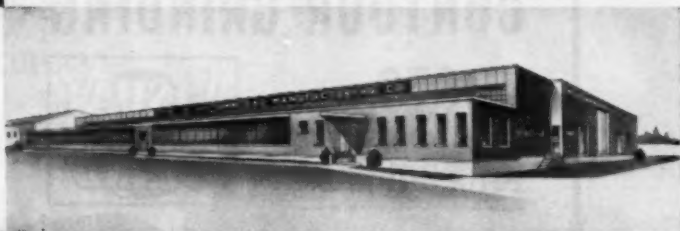
The Series 5000 Narda SonBlaster features a generator with full 500 watt output and a fully transducerized 10-gallon tank. The generator is equipped with tank selector and load selector switches so that it can operate one



Generator can operate one ultrasonic tank or two tanks alternately.



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lines of
automatic
machines
integrated
into
1

Big new factory to meet world demand for TOWNSEND Qualimatic MACHINES

The demand for Townsend machinery has quadrupled during the last few years. In order to bring under one roof the engineering, manufacturing, shipping and main offices for all 4 Townsend lines we have built this spacious, modern building. When in Hartford please come and see us.

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COCHRANE-BLY

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ultrasonic tank, or two tanks alternately, or submersible transducers in tanks up to 30-gallon capacity.

The generator will operate from six to ten Narda high-energy submersible transducers, at any one time, for use in any arrangement in any shape tank up to 70-gallon capacity.

The Narda Ultrasonics Corp., 625 Main St., Westbury, L.I., N.Y.

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Compound Slide Rest

A compound slide rest is now available for all Hardinge precision lathes. It is equipped with a rugged square body tool post taking standard $\frac{3}{8}$ " square high speed steel or carbide tool bits. The tool post has an integral screw feed wedge type arrangement for holding the tool bit and is claimed to be fast, accurate, rigid and ideally suited

SAVE 50%

or more in

CONTOUR GRINDING

COSTS with

Micromaster



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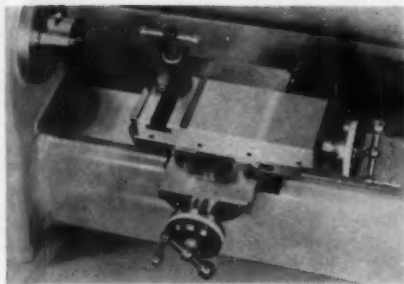
Providence,
Rhode Island

Visual Grind is manufactured by

The CLEVELAND GRINDING MACHINE Co.

1670 EDDY ROAD • CLEVELAND 12, OHIO

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Tool post takes $\frac{3}{8}$ " hss or carbide bits.

for use with carbide tools.

Magnified settings afford precise angular adjustment of the index slide. Easy reading black and white feed screw dials make working to close tolerances easy. Completely covered feed screws provide full protection against chips. The slide rest features a quick-acting safety interlock for bed positioning and double lock arrangement for index slide.

Hardinge Brothers, Inc., Elmira, N.Y.

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Even without pilots or finger stops . .

"RFC" Automatic ROLL FEEDS*

**control feeding to
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REVERSES INSTANTLY

Shift Feed Finger spring from one lug hook to opposite side

CAN'T SLIP

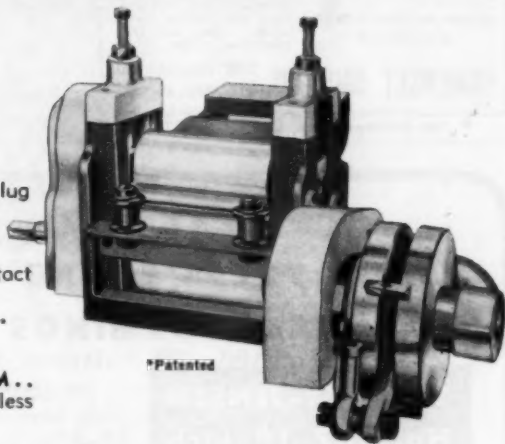
Each wedge has 4 points of contact

NO RATCHETS OR PAWLS . . .

to wear down

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with fewer working parts for less maintenance



Write for new brochure containing 39 standard feeds which are applicable to all METALS, FELT, CARDBOARD, PLASTICS, PAPER, WIRE, RUBBER in ALL WIDTHS, LENGTHS and THICKNESSES.

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Machine Drills or Taps Up to 12 Holes at Once

The two Deka-Drill multiple spindle drilling and tapping machine models are essentially alike, except that M-712 is manually operated by hand or foot pedal while H-712 has a fully automatic cycle. The machine has a 2 hp, 1200 rpm, three phase motor.

At 60 sfm and $1\frac{1}{2}$ " feed per minute, the drilling capacity is: six $\frac{3}{8}$ ", ten



At new low price \$124.50
with diamond

SOMERSET TOOL CO. 244 Virginia St.
Hillside, N. J.

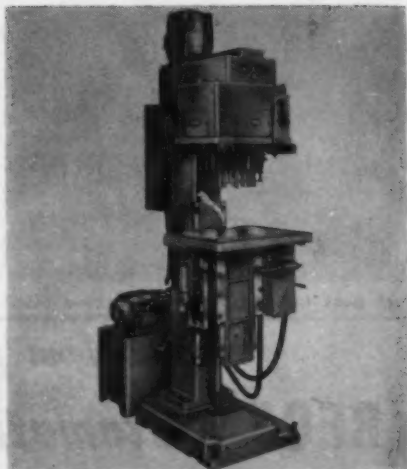
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RADIUS DRESSER

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Cut production time without sacrificing accuracy! Easy to set, easy to see, eliminates necessity of guard removal. Somerset Radius Dresser turns "tricky" jobs into routine operations. Write for free illustrated folder.



Hydraulic assembly is at rear of machine.

5/16", or fourteen $\frac{1}{4}$ " holes. At 75% thread, 20" per minute feed, the tapping capacity is five 5/16-18, eight $\frac{1}{4}$ -20, twelve 10-32, and fourteen 8-32 taps.

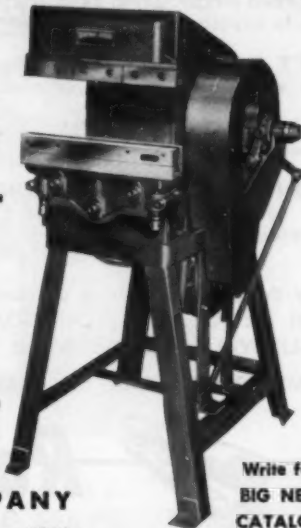
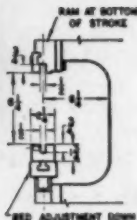
A NEAT LITTLE PRESS BRAKE FOR SMALL FORMINGS

WHITNEY-JENSEN
No. 247 18-inch
PRESS BRAKE

47 Strokes/min.

CAPACITY

14-Ga. Mild Steel or $4\frac{1}{2}$ Tons



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On Model H-712 the hydraulic pump is bolted directly to the motor face for perfect alignment. The rated capacity of the pump is 700 psi; however, the pump is set at 360 psi, activating, in turn, a 3" double-end cylinder boosting the pump capacity 6.3 times. The four-way valve has an open center so that when the machine is not in cycle the hydraulic motor and pump are idling.

Both standard models are capable of drilling and tapping up to and including

a total of twelve holes; more spindles can be supplied on special order.

Precision Tool & Mfg. Co., 1305 S. Laramie, Cicero, Ill.

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An improved groove gage is designed to simplify and speed up precision measurements of grooves. Readily mounted attachments provide flexibility; this instrument may be used for



Specifications

- Capacity — 5" rounds, 10" flats
- Height (closed) 30"
- Blade length — 7'5" x 1/2" x 23 ga.
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- Motor — 1/3 H. P., any voltage with 25' ext. cord
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- Built-in blade, cord and tool compartment

JOHNSON model M—Mobile

The right saw in the right place pays for itself—fast! The Johnson Model M metal cutting band saw eliminates all hand cutting. It will cut anything on the job including time and labor costs. Completely portable, mounted on big rubber-tired wheels, it handles easily and it's simple to operate. Preferred by contractors because it's built to last, can be used indoors or out and so economical to buy and operate.

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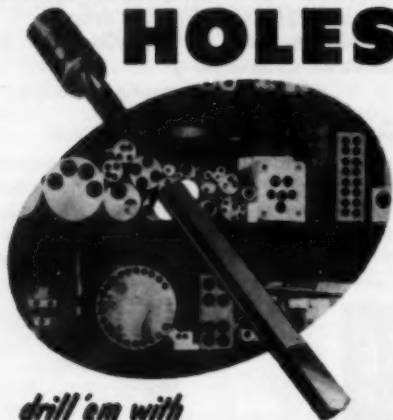
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HOLES



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Drivers	.750" dia. x 2 3/4" long	1" x 2 3/4" long
Tips	Carbide	Carbide

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OA Lengths	4" to 120" with dia. limits
Drivers	To fit your need
Tips	Carbide



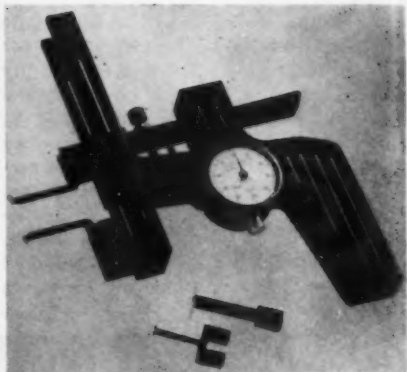
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Specializing 100% in GUN/DEEP
HOLE DRILLS and Related Tools.

**ELDORADO TOOL & mfg.
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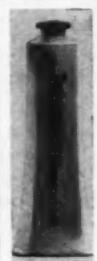
Attachments provide unusual degree of flexibility

a wide range of internal and external measurements, including snap ring, Truarc and O-ring grooves.

Introduction of human error is claimed to be eliminated by a feature which utilizes adjustable spring pressure to reach gaging position where the desired measurement is to be taken. Any slight distortion of the tips in transferring a measurement from the master or gage blocks to the work is automatically cancelled out, assuring that the gage will repeat measurements with precision. Readings are taken directly from a solidly mounted dial indicator calibrated in .0005 in.

Mueller Gages Co., 1052 N. Allen Ave., Pasadena, Calif.

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Without Expensive Diamond Compounds with Tetrabor

• Tetrabor is an oil paste of boron carbide especially for lapping carbide or steel tools and dies—polishing plastic molds.

• **CUT LAPPING COST**—Tetrabor costs much less than diamond.

• **INCREASE PRODUCTION**—Faster acting than conventional compounds. Gives superior finish.

• Available in 100 gram tube in a range of grits for every application.

Order trial kit containing 5 grams of 12 grits. Post Paid for \$15.50: Send for literature. Dealer Inquiries Invited.

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Buffalo 16, New York

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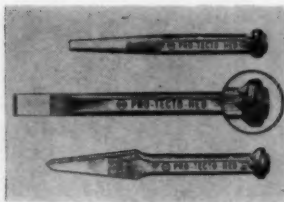
MACHINE and TOOL BLUE BOOK

Chisels, Punches Increase Safety

Pro-Tecto-Hed chisels and punches feature a raised "upset" head which defeats "mushrooming" and chipping, affording greater safety and longer life. This is claimed to be the first real improvement in chisel and punch design for 50 years. Trip-hammer forged from special analysis steel, each tool is tested for hardness and toughness. They comply with all Federal specifications.

Cincinnati Tool Co., Cincinnati 12, Ohio.

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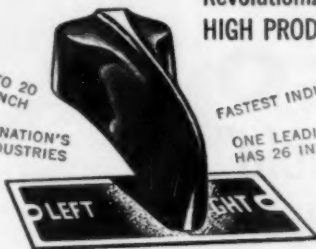
Upset head defeats mushrooming.

NEW

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FASTEST INDUSTRIAL BALANCER

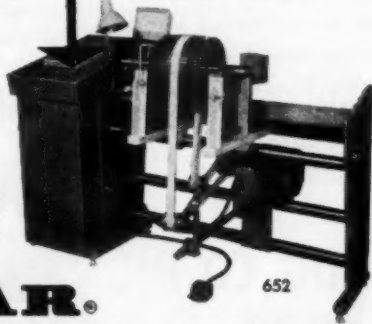
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Single Lever Control Does It!

A flick of the wrist shows both magnitude and location of unbalance. Unskilled workers can balance up to 200 parts

an hour... sitting or standing. One large dial tells operator everything he has to know to do perfect balancing.

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BEAR.

the most complete line for both PRODUCTION and MAINTENANCE BALANCING
BEAR MFG. CO., Dept. M-38 Rock Island, Ill.

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the
VIMCO
 "foothold"
 has a grip of steel!

Built with a permanent magnet in its base, the Vimco Foothold lamp will cling to metal with a 100-pound pull. Perfect for supplemental lighting, it adheres to machine tools as stubbornly as a riveted lamp — yet can be moved wherever you want it! 350 rotary motion, 180 angle swivel. Use postpaid card.

Circle No. 350

VIMCO MFG. CO. INC.

Since 1919

111 Brayton Street, Buffalo 13, N. Y.

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172

Checking Stand Used With Small Bore Gage Sets

The Diatest checking stand, for use with any of the four Diatest small bore gage sets, is reported to cut checking time and eliminate chance of error



Five separate adjusting and locking devices.

when measuring bores or locating discrepancies in bores, when more than one like piece is to be gaged.

Five separate adjusting and locking devices are incorporated in the design. (1) Locks gage in vertical position or at 45° to 90° angle; (2) locks beak of stand at desired height; (3) raises

DANNEMAN *Precision*
DIE SETS



Precision bored on master plates

Catalog on request

DANNEMAN DIE SET DIVISION

Acme-Danneman Company, Inc.

203 Lafayette St., New York 12 • AL 5-7150

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MACHINE and TOOL BLUE BOOK

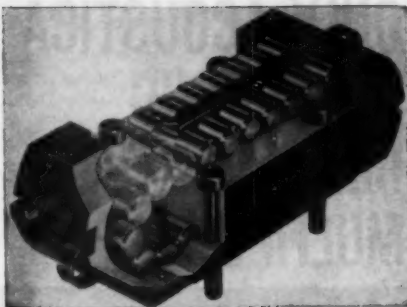
and lowers the table; (4) locks table at desired height; (5) centers or positions piece-part to be checked.

Foster Supplies Co., 6122 Milwaukee Ave., Dept. NE, Chicago 46, Ill.

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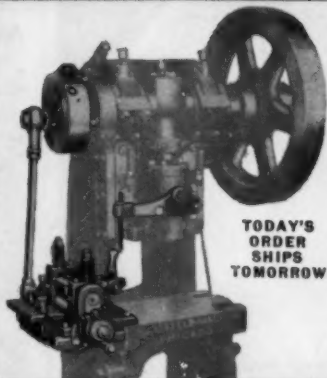
Bearing Features Improved Mounting Method

Four through-holes accept socket head cap screws to provide simplified mounting method for anti-friction way



LITTELL Style "M"

The "Install-
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Roll Feed
That Makes
Medium Duty
Presses Up to
5 Times More
Productive!



TODAY'S
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SHIPS
TOMORROW!

Install the Style "M" yourself. Three steps.

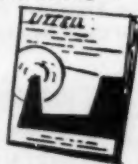
1. Cut and thread the connecting rod.
2. Bore and install the disc hub.
3. Fabricate and mount lifter bracket.

Simple instructions in Bulletin 702 furnished with your order make installation easy. 5 sizes. Maximum stock widths, 4" to 12". Left to right feed. Feed lengths, 0-2" through 0-4 $\frac{1}{2}$ " with plain gears, and 0-4 $\frac{1}{2}$ " through 0-8 $\frac{1}{2}$ " with compound gears. Engineered feeds with all parts complete are delivered in 4 weeks.

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bearing designed to give unlimited travel, constant accuracy and reduction of feed power. The center guided roller eliminates roller skew, minimizes bearing wear and lubrication requirements.

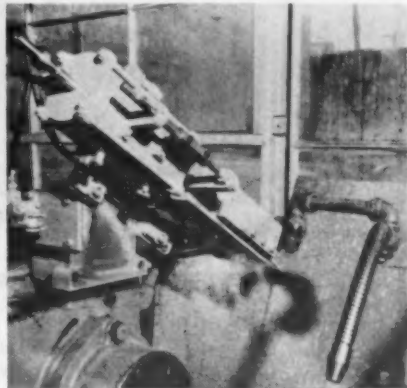
All working parts of the bearing are made of 52100 bearing steel to provide long bearing life and operational accuracy. The recirculation bearing is available in varied loads from 2000 lb. to 32,000 lb. in standard precision or with matched sets for extremely accurate applications in precision machines.

Tycho Mfg. Co., 561 Hillgrove Ave.,
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Automatic Cut-off Tool

The Lloyd automatic cut-off tool eliminates hand traversing of cross



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WE HAVE 22 JIG BORERS

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MACHINE and TOOL BLUE BOOK

slide; provides an additional station on turret; increases production on cut-off operation, and is said to reduce operator fatigue.

The tool can be swung aside instantly when not required for operation. It is easily attached to any ram type turret lathe. Variable speed adjustment on cut-off operation is another feature.

Lloyd Tool Corp., 3330 E. Colorado Blvd., Pasadena, Calif.

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Micrometer Arbor Spacers

Machine operators can cut their set-up time in half and practically eliminate scrap with newly developed adjustable micrometer arbor spacers, the manufacturer claims. These precise adjusting spacers are used primarily for straddle milling. Other applications are: raising blocks, fixture spacers, gage sets, and stops for milling machines, lathes, drill presses, turret lathes and die jacks.

Spacers have one-thousandth grada-



BOX ANGLE IRON

Saves Valuable Layout, Inspection and Machining Time

This unusually versatile Taft-Peirce tool serves as both a universal right angle iron and box parallel.

Four sides open for convenient work-clamping, and for clamping Box Angle Iron to machine table or surface plate. Two solid faces for use as right angle iron.

Highly accurate and made from close-grained cast iron,

heat treated. Working surfaces are precision ground with overall dimensions held to size within .0005", opposite sides parallel within .00025" and adjacent sides square within .0005".

Send for New Catalog 511 on Production and Inspection Equipment. 34 pages showing complete line.

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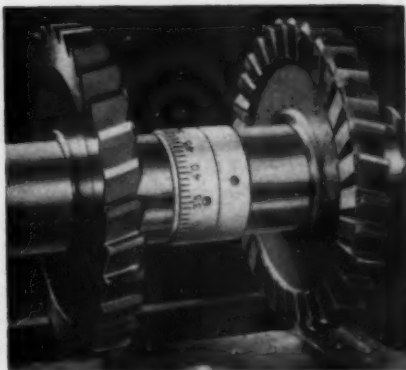
The only complete line of grinding wheel dressers and cutters

Desmond

Desmond-Stephan Mfg. Co.
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176



Locking type arbor spacer—1½" size.

tions. They make it unnecessary to use shimstock and/or paper as a means of spacing. They are available in ¾" to 1½" widths, and larger sizes up to 5" can be made on special order. Special sizes can be made to specifications.

Narrow sizes have 1/16" adjustment and the wider sizes have up to ¼" adjustment. One revolution equals 1/16".

Each spacer has a keyway slot. Those with widths ¾" to 1" are a non-locking type, widths 1½" and up are a locking type.

Mayer Engineering and Mfg. Co., 815 S. 9 St., Milwaukee 4, Wis.

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MACHINE and TOOL BLUE BOOK

Drill Press 5-Position Turret Head

The Quindrill five-position turret head makes possible five different operations on one drill press—drill, ream, countersink, counterbore, tap—with-out changing setups. It is available in sizes to fit most any drill press, including 15" and 20" Deltas—for Morse taper and Jacob taper spindles.

Chicago Quadrill Co., 1846 Busse Highway, Des Plaines, Ill.

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No changing of setups

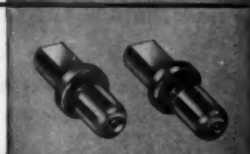
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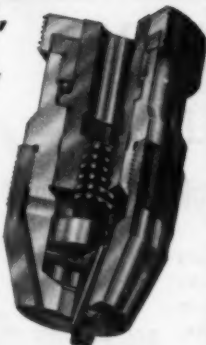
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Available in five capacities from 5/32" to 5/8" — right hand drive only — for all standard taper shank arbors.

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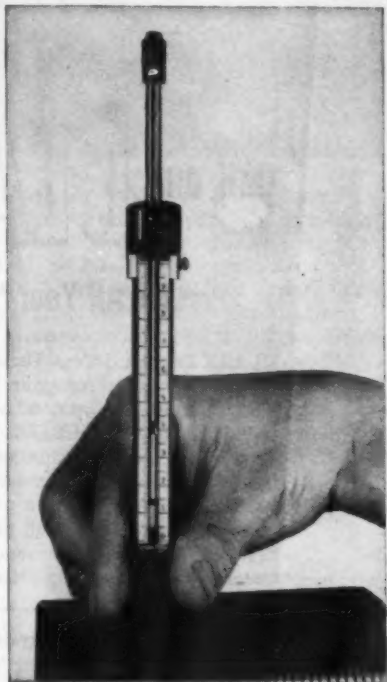
MEMPHIS, MICH.

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178

Portable Hardness Tester

The Sklero portable hardness tester can be carried in a shirt pocket, enabling the user to make on-the-spot hardness readings without moving the test piece to large stationary test equipment. Operating on the rebound principle, it provides consistently accurate readings



User makes on-the-spot hardness readings.

HOLES

WITH PRECISION ADJUSTMENT
M-3 H.S.S. OR CARBIDE



Clark "FINISHING CUTTERS"
P. O. BOX 990 BEVERLY HILLS, CALIFORNIA

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MACHINE and TOOL BLUE BOOK

to within plus or minus of one point Rockwell C. Test readings can be converted to Rockwell Shore or Brinell by the conversion table provided.

Operation is simple and fast. The instrument is merely placed in a vertical position on the article to be tested. The rebounding bar, which carries a hardened steel ball point, is raised, and when released rebounds to a point corresponding to the hardness of the object and is locked into position for reading.

Combined weight of instrument and case is only nine ounces.

Precise Products Corp., Racine, Wis.

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Throwaway Insert Milling Cutters

A new type of throwaway insert milling cutter, called the Throw Clear line, utilizes the $\frac{3}{4}$ " square positive rake throwaway carbide inserts. The combination of negative radial rake,

ONLY



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positive axial rake and 45° peripheral lead angle is said to produce a shearing chip action which throws the chip clear of the work.

The insert is firmly locked in the cutter pocket against the back and two sides. The wedgelock in front of the insert is shaped to provide adequate chip room.

Very high feed rates and economical stock removal capacity, with no re-



Wedgelock provides adequate chip room.

grinding, are reported possible. The cutter has been successful on applications ranging from aluminum to heat-treated high heat-resistant stainless steels, the manufacturer claims.

The Viking Tool Co., 1000 Nichols Rd., P.O. Box 471, Shelton, Conn.

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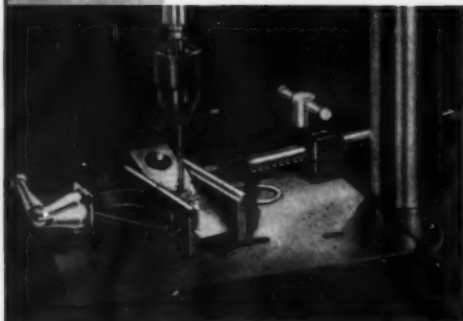
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DRILL PRESS VISE

Floats and locks instantly, positively, in any position on table. Holds work safely for accurate drilling and tapping. Two models: 9" and 12" capacities.

Write for illustrated folder and name of nearest distributor to AMF Tool Division, American Machine & Foundry Company, 224 Glenwood Ave., Bloomfield, N. J.



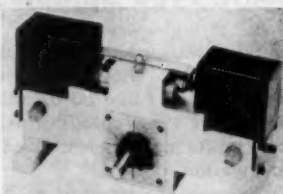
WAHLSTROM® / FLOAT-LOCK®
AUTOMATIC CHUCKS SAFETY VISES

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Power Unit Provides Reciprocating Rotary Motion

A self-contained rotary torque power unit offers possibilities for low-cost, controlled hydraulic power in many machine tool, aircraft, missile, and commercial applications. Operating at a power input range from 50 to 1000 psi, the new unit converts hydraulic pressure into reciprocating rotary motion that is easily regulated to fit all job requirements. Cleveland Pneumatic Industries, Inc., 64 Old Orchard, Skokie, Ill.

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Electric solenoid actuation optional for both directions.

when millionths count... hold them with

Myford 5" x 12" Cylindrical Grinders

Exclusive Features—Unbeatable Price!

- Cartridge type nitralloy wheel spindle—rapidly interchangeable.
- Long tapered, phosphor bronze, pre-loaded twin angular contact precision bearings with forced lubrication.
- Wheel feed with hardened threadground feedscrew.
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Finish to . . . 3 microinches

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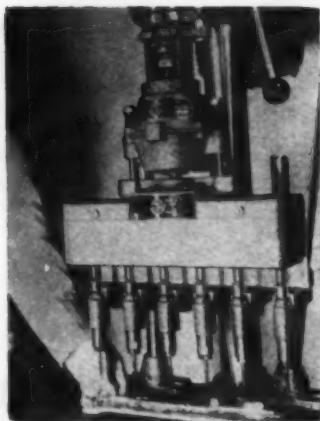
41 East 42nd St.—Dept. F-7 New York 17, N.Y.

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Drilling Head Has Ball Joint Type Spindles

A straight-line model adjustable spindle multiple drilling and tapping head, called the Knuckle-head 1000, features six fully adjustable universal ball joint type spindles. All universal ball joints are lubricated with one-shot lubrication.

Designed to operate in any position on any drill press or tapping machine,



Multiple spindle head attached to a drill press for tapping a typical small part.

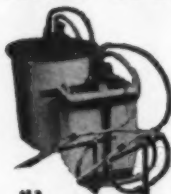
the heads will run at top speed in either direction, drilling or tapping a large variety of hole patterns without a reversing motor.

The heads are available with either

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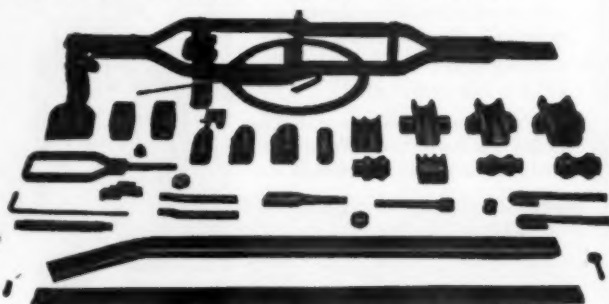
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adjustable locating arms or aluminum templates, which offer the advantage of fixed spindle operation.

Ettco Tool & Machine Co., Inc., 594 Johnson Ave., Brooklyn 37, N.Y.

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Pipe, Tube Cut-off Machines

New Continental rotary pipe and tube cut-off machines increase production rates and lower costs per cut length of

pipe or tube, the manufacturer claims. These 1959 models with hydraulic power checks were designed for users whose needs range from smallest and lightest gauge tubes to heavy-walled pipes in diameters up to 12 $\frac{3}{4}$ " o.d.

Increased speed and precision control has been achieved by designing the machines with J.I.C. electronic and hydraulic components. Now more pipes can be cut each day, it is reported, and

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EVERY TIME with a
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SO PRACTICAL! • It operates on ONE STATION* on your automatic just like other screw machine and lathe tools. It advances! It marks the part! It clears it!

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*Consult us regarding use of the NM marker with existing tooling where no station is available.

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Typical Radial End-face Automatic Roll Marker — Model 900-AC.



A Custom Dual-Purpose OD Automatic Cut-off Marker.

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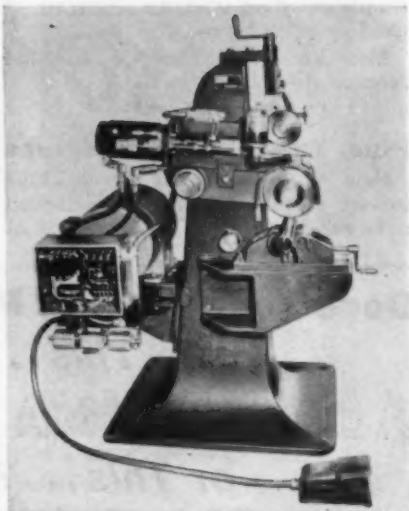
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Cuts pipe from $\frac{3}{8}$ " to 12- $\frac{3}{4}$ " o.d.

a whole new group of exceptionally thin wall tubing can be cut without a toe-in of the cut edge.

The hydraulic power check achieves a smooth cutting stroke by keeping the exact uniformly regulated cutting pressure on the wheel and work. Machines cut pipes and tubes from $\frac{3}{8}$ " to 12- $\frac{3}{4}$ " o.d. from light gauge to $\frac{1}{2}$ " wall thicknesses.

Continental Machine Co., 2345 W. Nelson St., Chicago 18, Ill.

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BALANCED ALLOY LEAD HAMMERS

HANDLES AND MOULDS

1, 1 $\frac{1}{2}$, 2 $\frac{1}{2}$ and 5 lb. sizes—order your alloy lead hammer requirements from your mill supply house or direct from:

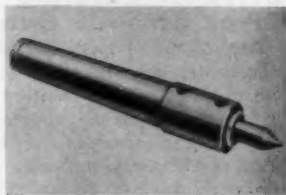
KITZMAN MFG. CO.
Manufacturers Of Lead Hammer Products
15061 Hartwell Ave. Detroit 27, Mich.

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MACHINE and TOOL BLUE BOOK

Dead Center Modernizes Lathes

This spring-loaded dead center is not subject to the ill effects of thermal expansion of mandrels or workpieces, which produces excessive end thrust pressure. This pressure causes burned points, damages bearings and destroys accuracy. The end thrust of this dead center can be adjusted to meet the requirements of each job. All parts essential to its operation are honed or lapped to close tolerances. Chemtor Products Co., Franklin, Mich.

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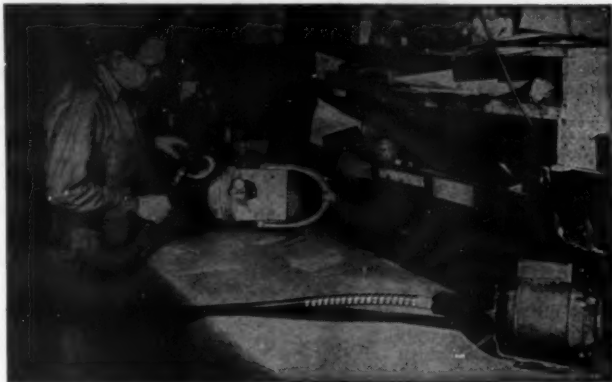


Simple, precise construction affords longer life, less maintenance, ease of use.

NEW, LIGHTWEIGHT, POWERFUL

FLEXIBLE TOOL SHAFT

Connects To Any Motor



Stow flexible tool shafts increase precision, eliminate operator fatigue on production grinding, polishing, sanding and other finishing operations in which the operator must hold the tool for long periods of time. Up to 3 HP can be transmitted through these new tool shafts, which consist of a core made of highest grade music wire rotating inside a rubber-covered casing. Each shaft furnished with ball bearing motor connection and high-speed ball bearing handpiece with removable wheel Arbor having $\frac{1}{2}$ -20" threads. An angle head can be used in place of the handpiece as shown in the photograph.

Four Sizes of these shafts are available . . . models 38, 40, 50 and 63, which come in 6-foot standard lengths. The largest shaft, model 63, will handle 3 HP at speeds up to 6900 RPM and has a maximum capacity for various accessories as follows: grinding wheel, 8" x 1"; buffing wheel, 8" x 1"; sanding disc, 9" diameter; sanding drum, 8" x 2½"; wire brush, 8" x 2"; steel drills, ½" diameter.

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STOW MANUFACTURING CO.

30 Shear St.

Binghamton, New York

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Drive of Painting Unit Gives Smooth Gun Travel

An automatic spray painting machine evenly deposits the paint material over the piece part. The positive mechanical reciprocating drive reportedly permits smooth gun travel. Air triggers the guns, which automatically shut off at the end of each stroke. The machine is of value in translucent applications.

The 36" high, 47" long, 30½" deep machine sprays up to 8" wide and 22"

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Has 2 contacts 1/32" threaded within 1/8". Double Faced. Reads front and back. Two Crystals. Double faced dial indicator complete with plated holder including 1/32" and 1/8" contacts—

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- SQUARE BLADES Easily Replaced.
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- Lowest Blade Cost.
- Cutters from 1½" to 14" dia.



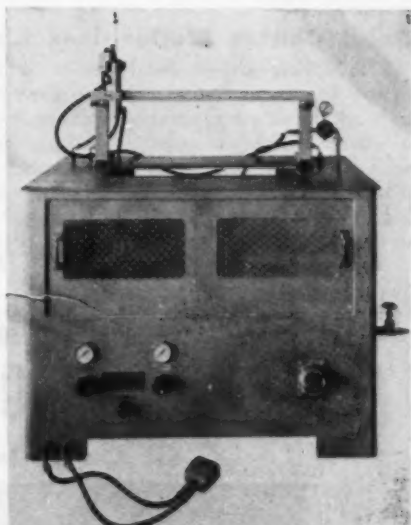
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MACHINE WORKS

182 SIGOURNEY ST. BROOKLYN 31, N. Y.

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Guns automatically shut off at the end of stroke.

long. The speed of gun travel is adjustable from 35' to 90' per minute.

Two automatic spray guns and a 12" diameter round exhaust duct collar are supplied with the unit. There are a number of optional features.

Conforming Matrix Corp., 394 Factories Bldg., Toledo 2, Ohio.

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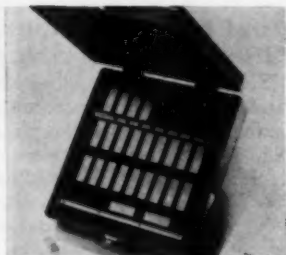


Ultra Thin Gage Block Set

If you are concerned with miniaturization problems and the measurement of tiny screws and fittings, you may be interested in a 23-piece set of "ultra thin" tungsten carbide rectangular gage blocks providing sizes from .010 up to .100. There are nine blocks with .0001 increments, .0101—.0109; nine blocks, .001 increments, .011—.019; four blocks, .010 increments, .010—.040; one .01005.

Fonda Gage Co., Inc., Henry St., Stamford, Conn.

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Sizes from .010 to .100



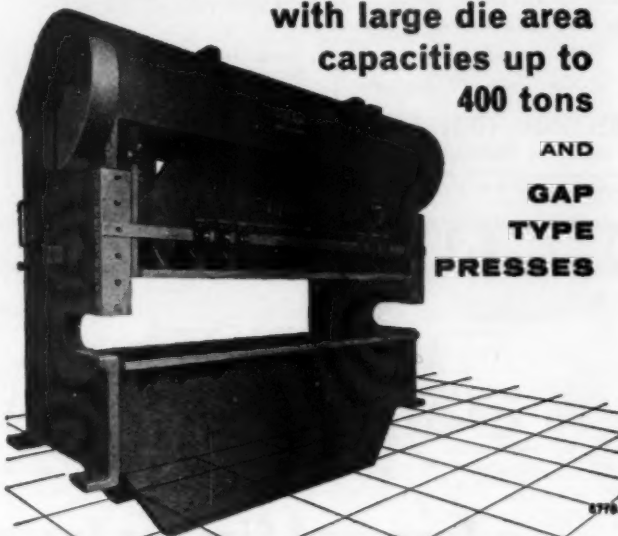
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STRAIGHT-SIDE TYPE

with large die area
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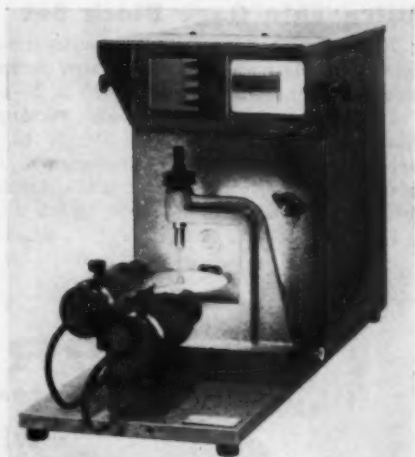
7446 South Loomis Boulevard, Chicago 36, Illinois

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Dual Image Comparator Eliminates Resetting Part

The dual image projector gives two simultaneous images through separate optical systems for coordinate checking. Effects in one plane are shown in the second. This eliminates resetting the part and repeating adjustments.

Shown is a small dual image projector for use in checking run-out of worm and disc assemblies for watt-hour meters. Magnifications here are



Projector checks run-out of worm assemblies for watt-hour meters.

alike for both images. Screen size is purposely reduced to include only the best features in question.

CAMS

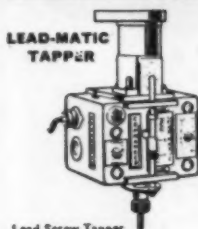
To Your Specifications
except Screw Machine Cams

Design Assistance Offered

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COMMANDER TAPPERS



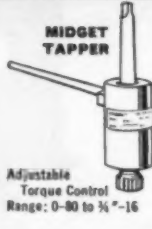
Lead Screw Tapper
Range: 0-80 to 1/4"-16



High Production,
Air Operated
Range: 0-80 to 1/4"-16



taps 2 to 15
holes at 1 stroke.
Adjustable
hole pattern



Adjustable
Torque Control
Range: 0-80 to 1/4"-16



Pressure Sensitive Drive
Range: 0-80 to 10-24

a Type and Size for Every Job!

Commander Tappers are made in 10 models — each designed to handle tapping jobs over a wide range. From the Commander Tapper line, you can select the right unit to give you the exact performance your job requires. Whichever Commander Tapper you select, you will get unequalled performance and tapping economy. Sold and serviced by drilling and tapping specialists. Write for the Commander Production Tool Catalog and name of nearest Distributor.



Commander MFG. CO. 4227 W. KINZIE STREET
CHICAGO 24, ILLINOIS

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Screens to accommodate magnifications and part sizes range from 3"x3" square to 20" diameter, with separate screens for each view or both images appearing on a single screen.

Stocker & Yale, Marblehead, Mass.

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Expanding Collets for Internal Chucking

Two types of expanding collets for internal holding operations have been developed by the Wade Tool Co., Wal-



Two types—one-piece, interchangeable



Six machines protected from dust by Torit for **\$666¹⁵**

This Torit Dust Collector, Model 219FM, complete with accessories, was installed by the Mohr Lino Saw Co., Skokie, Ill., to protect 3 belt sanders and 3 other grinders (2 grinders hidden from view) from destructive dust—at a total cost of just \$666.15!

After one year's operation, Mohr Lino Saw says this about their *low-cost* Torit installation: "The Torit installation has kept our shop *cleaner*, our operators *happy*, and protected vital machinery."

You too can achieve greater machine protection and cleaner working conditions by trapping dangerous or valuable dust *at its source* with a completely *self contained* and *portable* Torit Dust Collector. For full details write to:

TORIT MANUFACTURING CO.
Dept. 603 311 Walnut Street, St. Paul 2, Minn.



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tham, Mass.—both actuated by a ball-bearing lever collet closer.

One model (8U-155) is of one-piece construction and is said to hold a work-piece as small as $\frac{1}{8}$ " diameter. Steps can be turned on it, to suit various internal diameters, or after finishing one job it can be used again by turning down to a smaller diameter. A collar can be furnished to hold accurate shoulder dimensions.

Model 8U-165 makes use of interchangeable expanding collets for different sizes, and provision is made for truing up the collets if necessary when they are changed. This model will take somewhat larger work than the 8U-155 and will hold exact shoulder lengths. It can be used only on lathes having the American Standard spindle nose.

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Guaranteed

FOR 18 MONTHS
AND THAT'S NOT ALL

The unique new Clearing Torc-Pac is not just the finest design in the press field—

it's the finest in quality and performance.

That's why Clearing can guarantee these 22, 32 and 45 ton presses for 18 months.

You get more for the money when you buy a Torc-Pac and more in performance too.

Write for details



Clearing

DIV. OF U. S. INDUSTRIES, INC.
6489 W. 62TH ST. CHICAGO 38, ILL.

Use postpaid card. Circle No. 354

Portable Power Hack Saw

Hand-I-Hack's high speed blade cuts anything from 3" x 3" solid steel to thin-wall tubing with a tolerance of .005", and its regulated cut allows it to be used in any position—even upside down. The 48-lb portable can be carried to where the job is, whether it is for general maintenance work, cutting off short pieces in the stockroom, or cutting chips for metal laboratories.

Lipe-Rollway Corp., Syracuse, N.Y.

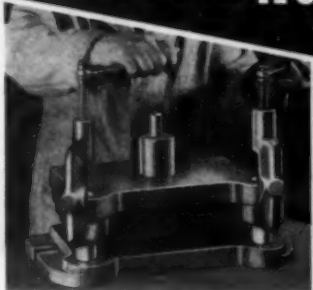
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Sawing action adjustable from pressure required for solid steel to feather touch needed for thin-wall tubing.

FOR EASY, FAST UNIFORM SEPARATION OF DIE SETS...

USE THESE **ACRO** PULLERS.



Separate die sets with even upward pull.

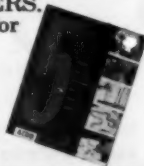


Die sets separate evenly and safely.

When you have die set pullers that remove the punch holder from the die shoe by a straight upward pull and the punch holder slides upward from the die shoe simultaneously and safely from both leader pins, you have Acro Die Set Pullers and you're saving time.

If you're not, this is how it's done with Acro Pullers: Indexed screw wrenches act as indicators, controlling the upward travel. This is an exclusive patented Acro feature and found only in **ACRO DIE SET PULLERS**. It may pay you to investigate. Write for further free information today.

OTHER ACRO TIME SAVERS FOR YOUR SHOP include Acroflex, drill rod racks, leader pin oilers and wing nuts. Write for complete descriptive folder. Ask for bulletin TP59.



ACRO

METAL STAMPING COMPANY

3308 E. Reservoir Ave., Milwaukee, Wis.

Use postpaid card. Circle No. 355

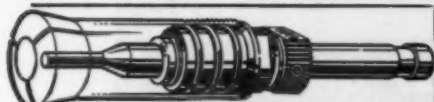
Flat Stock Finisher

Model KP flat stock grinding and polishing machine is a pinch-roll type that will handle coil, sheet and bar stock. It is made in four different sizes, having belt widths of 8, 10, 12 and 15 inches; belts are operated by motors ranging from 5 to 15 hp. Pinch roll drives are from 1/3 to 1/2 hp. Stock feed rate is adjustable from 1 to 60 fpm.

Features: pneumatic belt tension; positive manual or automatic belt track-



Handles coil, sheet and bar stock.



NEW! Self-Centering 5C Collet Stop

Quick friction adjustment. Stays in fixed position. Will not distort collet. Will not move back. Also available for other collets and spindles. 30 Days Free Trial. Several Territories Open for Distributors.

Write for Bulletin.

BYCO INDUSTRIES

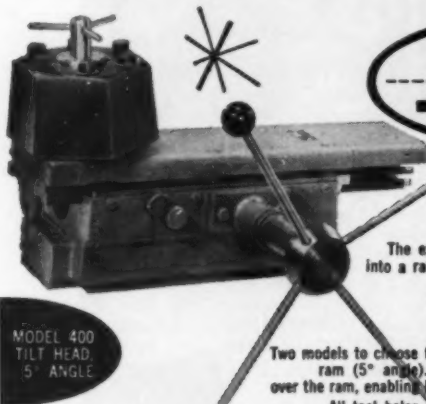
2201 Snelling Ave. Minneapolis 4, Minn.

Use postpaid card. Circle No. 356

ing; micrometer grind pressure adjustment; V-belt drives for the abrasive belt to permit belt speed adjustments; infinitely variable control of pinch roll feed; easily changed contact rolls.

Acme Mfg. Co., 1400 E. Nine Mile Rd., Detroit 20.

Use postpaid card. Circle No. 116



MODEL 400
TILT HEAD
5° ANGLE



BED TURRETS

NOW YOU CAN DO MULTIPLE MACHINE OPERATIONS

The extra heavy duty AK Bed Turret will convert your engine lathe into a ram-type turret lathe for production that would normally require several machine operations. This heavy duty, self-indexing, precision bed turret with six station mechanite head, has been specially designed and engineered for the larger lathes in the 13" to 16" range.

Two models to choose from, either the straight ram or the tilt head ram (5° angle). The tilt head model allows greater clearance over the ram, enabling larger tools to be utilized.

All tool holes are blank to permit user to align them with spindle hole. Complete instructions furnished for mounting turret and machining holes.

- Manufacturer of PRE COR TOOLS: Collet Closer Attachments.
- Also Manufacturers of AK Bed Turrets, Cross Slides and Bar Feeds.

OTHERS AVAILABLE—10" TO 16" SEND FOR FREE LITERATURE

PRECISION PROCESSING CO.

3269 Casitas Ave., Los Angeles 39, Calif.

Use postpaid card. Circle No. 357

Fine Fluted Milling Cutter for New Tough Alloy Steel

Solid carbide, fine fluted milling cutter, for extremely tough alloy steels, produces a finish comparable to that of grinding, due to higher sfm and wider feed range.

The manufacturer, M. A. Ford Mfg. Co., Davenport, Ia., has been milling square punches with the cutters. According to company engineers, the design has doubled and in some cases

tripled production over high speed steel cutters. Tool life has been increased up to fifty times. In addition, the solid carbide construction eliminates vibration, and there is no possibility of braze failure.

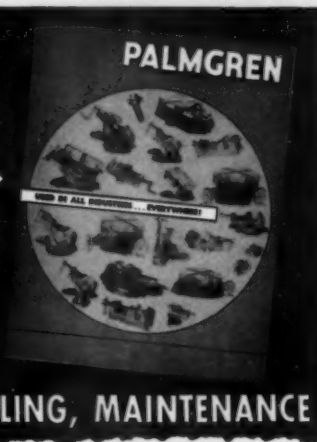
The material milled in the Ford operation has usually been S5 or S2 steel, with most of the cutting done in climb milling applications. Cuts have been up to 1/4" deep and 1/2" to 1" wide at a feed of 2" to 4" per minute.

Use postpaid card. Circle No. 117

WRITE NOW FOR
THIS

**FREE
CATALOG**

ON
WORK HOLDING
TOOLS FOR
PRODUCTION, TOOLING, MAINTENANCE



Drill press vises, angle vises, swivel machine vises, rotary tables, lathe milling attachments, production vises, heavy duty angle vises, and adjustable angle plates are illustrated and fully described in the New Palmgren Catalog. This is the only complete line of work holding devices available anywhere. Designed for production, tooling, and maintenance work, there are 68 different models and types to choose from. Vise jaw sizes are from 1 1/2" to 8". Ask for your copy of this FREE Catalog No. 205 today. The complete line with details and prices are shown.

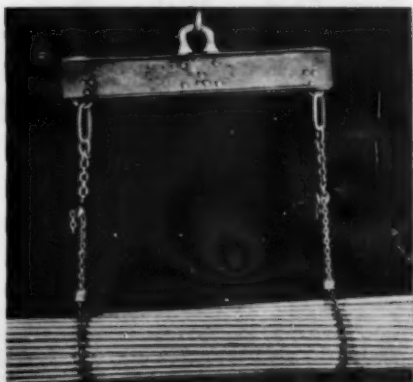
PALMGREN PRODUCTS

by CHICAGO TOOL AND ENGINEERING CO.
8314 SOUTH CHICAGO AVE. • CHICAGO 17, ILL.

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Bundling Chain

ACCO bundling chain is equipped with a drop-forged automatic locking device, and fabricated with one end of the chain permanently fastened to this lock. It is said to eliminate pear-shaped links and the need for pins and wire to bind and hold bundles. The assembly is furnished with low carbon, high test, or alloy chain—depending on the type of service and weight of the load to be bundled.



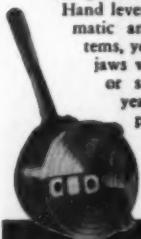
Grab hook pulls chain around bundle.

LABOR SAVING Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days.

Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.



Top
Jaws
open

Hand lever closes
and locks while
lathe is running.



Jaws locked

Write for bulletin 201 today.

CHUCK DIVISION

THOMAS HOIST CO.

24 S. HOYNE • CHICAGO 12, ILL.

Use postpaid card. Circle No. 359

In locking operations, the free end of the chain assembly is put through the housing and a grab hook on the dropper chain pulls the chain tightly around the bundle. The hook's latch automatically falls in between the links, locking the bundle securely.

In unlocking, the chain is again engaged by the grab hook and lifted, allowing enough slack for the latch to be flipped over. When the bundle is set down, the chain is run through the housing, automatically releasing the load.

The lock is made in two sizes. The larger, weighing seven lb, is used with 1/2, 9/16, and 5/8 inch chain. A smaller lock, weighing two lb, is used with 5/16 and 3/8 inch chain.

American Chain Div., American Chain & Cable Co., Inc., York, Pa.

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Rust-Lick
606

Used by leading manufacturers and metal fabricators. Also available in bulk—5 to 55 gallon drums.

Write for free sample on company letter-head

RUST-LICK, INCORPORATED 755 Boylston, Boston, Mass.

**MOISTURE ABSORBING
RUST-PREVENTIVE
LUBRICATING**

Mist

for—

TOOLS • DIES • JIGS
MICROMETERS • GAGES •
METAL PARTS • IDLE MACHINERY
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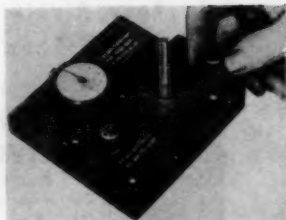
MACHINE and TOOL BLUE BOOK

Gage for Splined Shafts

The Splinedicator combines the function of five gages, replacing Go and No-Go composite rings and master plugs for each. A master ring checks the spline gage for the internal spline. The indicator is set with master setting plug of verified tooth thickness. Gage gives an accurate check of the "effective tooth thickness," eliminates human error, shortens inspection time, detects back taper.

Vinco Corp., Detroit, Mich.

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Exact part limits can be established on dial indicator.

IMPORTANT NEW "TOOL"

for Surface
Inspection
and
Control

The MICROCORDER

The Microcorder draws magnified surface roughness profiles that show (1) *peak-to-peak spacing* and *peak-to-valley height* of roughness irregularities and (2) *width* and *depth* of pits, scratches, chatter marks and surface porosity. It is simple to operate, and is designed for use in shop or lab — on metals, paper, plastics, etc. — for any length of trace up to 2 3/4" on ID's, OD's and flats.

FREE BULLETIN LT138 gives specs. Write —



**MICROMETRICAL
MANUFACTURING COMPANY**

345 S. MAIN ST., ANN ARBOR 4, MICHIGAN

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Spin Your Rivets Faster

on the NOISELESS LINLEY RIVETER



Cut production costs with the Linley. Quickly produces finely finished rivets. Takes rivets up to $\frac{3}{8}$ " in diameter in iron and cold rolled steel; even larger sizes in brass, aluminum and other soft metals. Send sample parts to be riveted and without obligation we will give you cost and time estimates of doing the job the easy Linley way.

Send Today For Bulletin R

LINLEY BROTHERS CO.

Also Builders of Jig Bore

673 State St. Ext., Bridgeport 1, Conn.

Use postpaid card. Circle No. 362

Safe STAMPING Sure POSITIONING

Stamp on rounds or flats with this impact-resistant rubber holder. Write for Prices and Bulletin 581.

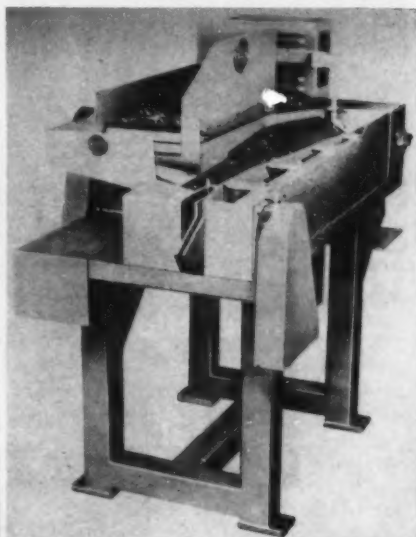


Mecco
SAFETY
H-DUR-ALL
Set-Rite
STAMP HOLDER
A product of the Marking Device Industry
M. E. CUNNINGHAM CO.
1048 CHATEAU STREET, PITTSBURGH 33, PA.

Use postpaid card. Circle No. 363

Feeder Feeds Fragile Parts to 30,000 Pieces an Hour

The Model 330-NM non-mar feeder claims to automatically orient and feed such parts as finished wrist pins, hydraulic valves and plungers, bearings,



Handles parts which are flat, round, cylindrical

glass or ceramic insulators at speeds of up to 30,000 pieces per hour. Parts handled can be flat, round discs or rings, cylindrical or rectangular in shape.

The demand-feed control is said to assure smooth continuous flow of parts to equipment being fed, whether single or multiple.

Radio Corp. of America, Industrial Automation Equipment, 12605 Arnold Ave., Detroit 39, Mich.

Use postpaid card. Circle No. 120

Micrometer Measures From Eight Inches Up

A large micrometer for internal and external dimensions may be used for measurements from eight inches up. The spring loaded dial indicates the exact size.

Mating parts may be measured with the same tool set with a single gage. The measuring rods are spring loaded in a protective tube for accuracy and rigidity. The removable terminal piece insures stability of the measuring elements. Supporting arms hold the instrument parallel to the line of measurement and provide measurement at predetermined internal depths.

Calibration is normally in .001", but readings in .0001" are available. The individual components are accurate to $\pm .0001$ ". The tools are available in standard sets with all accessories, including a calibrating device, for dimensions from 8" to 56".

Sidney J. Bunzel, 83 Payson Ave., New York.

Use postpaid card. Circle No. 121

Any speed from 50 to 11,000 fpm with this Vastly Superior NEW BAND SAW BY

TANNEWITZ

Ideal for tool room sawing, trimming castings or friction sawing steel and other metals formed or flat . . . the most versatile, efficient and best built machine in the field. Note these new features:

1. **HEAVIER CONSTRUCTION** than any machine of its type—solid as a rock.
2. **MAXIMUM CAPACITY** . . . unobstructed from blade to column—6" greater vertical clearance.
3. **EASIER BLADE TENSIONING** by remote control hand wheel on column.
4. **EASIER BLADE TRACKING ADJUSTMENT** with handily located lever and window.
5. **GRINDER AND WELDER** right where it is needed.
6. **AUTOMATIC HYDRAULIC AUTOMOBILE BRAKES ON ALL MODELS.**

These and dozens of other features that make it the greatest time and money saving metal cutting machine on the market. Write or phone for complete details.



THE TANNEWITZ WORKS, INC.

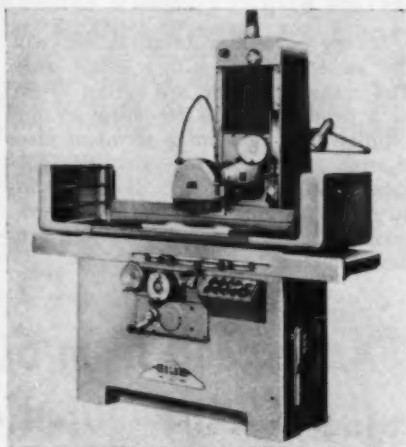
GRAND RAPIDS 2, MICH. • GL 6-1729

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German Surface Grinder Features Automatic Sizing

Automatic sizing for fully automatic downfeed and automatic cycle control is a feature of the German-made ELB surface grinder. The required final size is set only once and is then maintained during grinding without further measuring. Rapid traverse approach until wheel touches workpiece and automatic rapid return to preset starting position is independent of wheel wear and diameter of grinding wheel.

The tracer registers the size of the workpiece through the tracer pin, which descends at set time intervals and is not influenced by the number of pieces or interrupted surfaces, as the descent of the tracer between grinding areas is limited by the contacts. The switching impulses of the lifting tracer control the wheelhead slide through unheated valves acting on the control gear. Clutch fitted to the control gear transmits a high torque almost in-



Final size set only once.

stantaneously, enabling the smallest feed impulses at high switching frequency.

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N.Y.

Use postpaid card. Circle No. 122

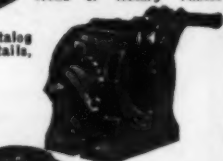
UNIVERSAL DIVIDING HEADS



Precision built to meet every requirement. Carroll Dividing Heads are the accepted standard in metal-working plants from coast to coast.

A unique optional swivel base makes possible speedy and accurate work settings to compound angles. This and other features convert a conventional Dividing Head into a Universal Work Head or Rotary Table.

Write for 8 page catalog giving complete details, etc.



10" - 12" Universal Right or Left Hand Dividing Heads with or without Direct Indexing.

CARROLL DIVIDING HEAD CO.

3525 Cardiff Ave. • Cincinnati 9, Ohio

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Comet[®] BORING TOOLS

(H.S.S. and Carbide)

for Holes from 1/16" upward

STANDARD AND SPECIAL
BORING, FACING & INTERNAL
THREADING TOOLS.

Write for Data



Bore Small Holes? Contact COMET



COMET Tool Co.

738-T4 Broadway

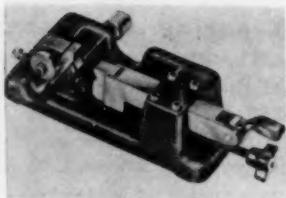
New York 3, N.Y.

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MACHINE and TOOL BLUE BOOK

Adjustable Drill Fixture

The Dandee Model SW-15 safety wire adjustable drill fixture is the first of a series of five fixtures to standardize many difficult drilling operations. This model holds $\frac{1}{4}$ " to $1\frac{1}{2}$ " hexagons, nuts, bolts, etc. Location of the safety wire hole in the corners of the hex or in round bodies is adjustable. Fingertip pressure on the cam-lock instantly clamps and releases parts to be drilled. Ace Drill Bushing Co., Inc., 5407 Fountain Ave., Los Angeles 29.



Holds $\frac{1}{4}$ " to $1\frac{1}{2}$ " hexagons.

Use postpaid card. Circle No. 123

SECOND TO NONE FOR SECONDARY FINISHING



SCHAUER SPEED LATHES!



They're low-cost, efficient machines for polishing, deburring, lapping and other secondary finishing work on metal and plastic parts. Many models. Write for new Catalog 580.

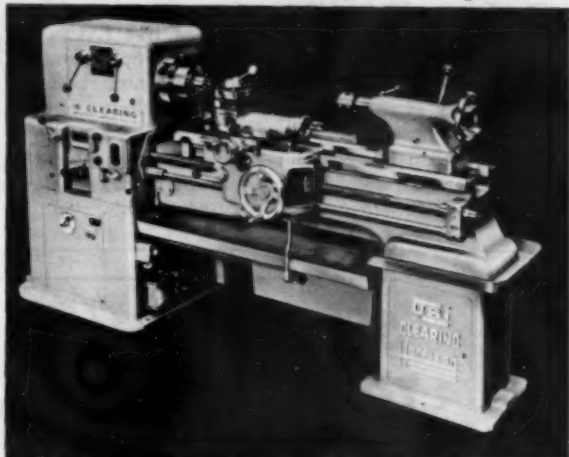
SCHAUER
MANUFACTURING CORP.

4502 Alpine Ave., Cincinnati 42, Ohio

Use postpaid card. Circle No. 367

Clearing Augments Lathe Line with English Import

The Clearing Division of U. S. Industries, Inc., 250 Park Ave., New York, has completed arrangements whereby it will sell and service English-made lathes throughout the United States and Mexico. The Clearing-Harrison line, manufactured by T. J. Harrison & Sons, Ltd., Heckmondwike, Yorkshire, England, ranges in size from 11 inches to 16 inches. The 16" lathe will be priced at about \$4500.



Clearing-Harrison line ranges in size from 11" to 16".

The Harrison machine is built to American standards and specifications. A complete line of accessories is available, as well as lathes

equipped with factory-built hydraulic copying attachments.

Use postpaid card. Circle No. 124

Allman Universal Hand Tapper 5 TIMES FASTER

A great time, labor and material saver. Fixture taps five holes to every one using the free hand method. Eliminate costly tap breakage.

CHECK THESE FEATURES:

- Articulate arm swings clear 1 large table for placement of work.
- Limitless number of sizes of tapped holes without moving work piece.
- Vice holds work as small as 3/8" square.
- Floating tap locates itself in hole.
- Individual spindle holds taps, thus change requires only seconds.



15 day
free trial
Satisfaction
Guaranteed
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**TOOLS,
INC.**

1735 No. 25th Ave. • Melrose Park, Ill.

Use postpaid card. Circle No. 368

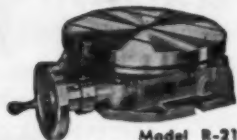
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New Design

Greater
Precision

Greater
Rigidity

6 Sizes • 8 Models



Model R-21

Guaranteed 60 seconds or less total accumulative angular error. (60 seconds equals .00087" at 6" diameter.)

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Write for FREE Catalog Number 23.



TROYKE MFG. CO.

11290 Orchard Street
Cincinnati 41 (Sharonville), Ohio

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MACHINE and TOOL BLUE BOOK

July, 1959

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Company

Name Position

Street

City Zone State

Product Mfd.

July, 1959

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209	234	259	284	309	334	359	384	409	434	459	484	509	534	559	584
210	235	260	285	310	335	360	385	410	435	460	485	510	535	560	585
211	236	261	286	311	336	361	386	411	436	461	486	511	536	561	586
212	237	262	287	312	337	362	387	412	437	462	487	512	537	562	587
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222	247	272	297	322	347	372	397	422	447	472	497	522	547	572	597
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Company

Name Position

Street

City Zone State

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PERMIT NO. 272
WHEATON, ILLINOIS

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MACHINE and TOOL BLUE BOOK

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WHEATON, ILLINOIS

NOW, no more part-time milling machine with

with

J & S NO-BEND

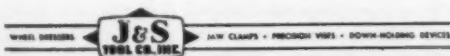
*hardened & ground
detachable*

**Milling machine ARBORS,
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**Full-time tooth
engagement, plus all
these features:**

Interchangeable to 40 or 50
taper machines • quick change
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support.

Write for free literature and price list.



J & S TOOL CO., INC.

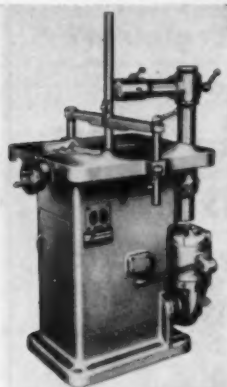
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**871 DORSA AVE.
LIVINGSTON, NEW JERSEY**

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This new MORRISON KEYSEATER can make money for you

Install it in your shop. Its low cost will amaze you. Watch it pay for itself. You can quickly eliminate costly production tie-ups caused by waiting for expensive outside services. This is not an ordinary keyseater. The Morrison Keyseater is quality built with machine tool accuracy. Practically anyone can operate it. It has automatic feed, automatic stop to cut off feed at given depths, automatic relief to back the work away from cutters, automatic centering, automatic lubrication. **NO BUSHINGS REQUIRED.** Cuts keyways $1/16"$ to $1"$. FREE new Catalog 714-A shows all features and specifications can be had by writing:



THE D. C.
MORRISON CO.
P.O. Box 1017C
Cincinnati 1, Ohio

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Polyethylene Bags So Cheap!



NOT A WHISPER—
of bad packaging
in **NBC
POLYCLEER BAGS.**

They are the
newest of every-
thing great.
Transparent, in-
destructible,
heat sealing, quick opening, pro-
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economical.

The perfect self-selling impulse
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**NORTHLAND manufactures NBC
POLYCLEER BAGS by the millions.**

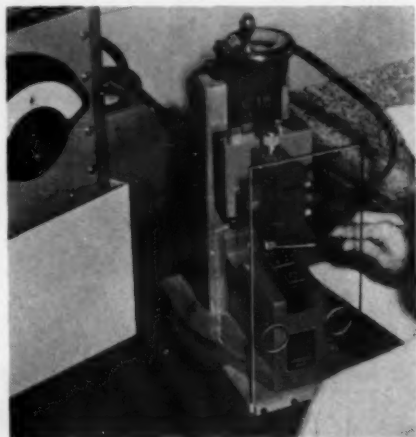
All Sizes • Gauges • Styles • Shapes
Plain and Printed 1-2-3-4 Colors
Write! Wire! Phone!

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33-C School Street, Yonkers, N. Y.
GREENleaf 6-1095

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Gage Block Comparator

Model 130 B-12 electronic comparator
is capable of detecting dimensional
variations of one-millionth of an inch.
It can measure gage blocks as large as



Better handling techniques can be used.

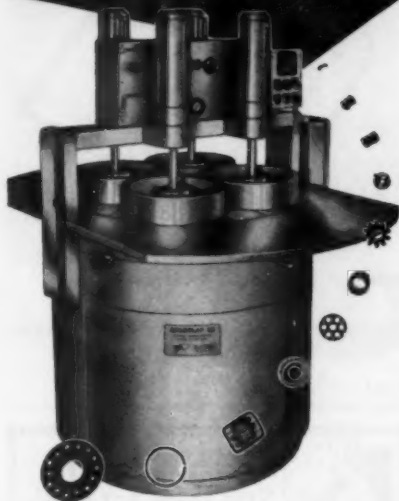
4". Its electronic amplifier provides
four magnifications: 2000:1, 6000:1, 20,-
000:1, and 60,000:1. Graduations are
.000030", .000010", .000003", and .000001",
respectively.

The reference platen is fitted with
two sets of three balls which provide
an accurate three-point reference sur-
face for comparing blocks. A reference
surface of this type helps to maintain
a constant temperature relationship be-
tween the master and the workpiece.
Parts are said to be positioned quickly,
and better handling techniques, such as
using heat insulated tweezers, can be
used. The balls are spaced in one set to
accommodate square blocks and the
other set takes rectangular. Another
type of anvil, one side serrated, the
other plain and lapped flat, may be sub-
stituted for comparing parts other than
gage blocks.

Federal Products Corp., Providence.

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**GET UP TO 600%
INCREASE
IN STOCK REMOVAL RATE**



GRIND AND LAP at the same time. Get lapping accuracy at grinding prices. Obtain finishes of 1 RMS; flatness and parallelism to 2 millionths of an inch . . . with metals, plastics and ceramics.

SPEEDLAP is a "lap-grinding" unit which uses a non-chargeable lap plate, also higher lapping pressures, to give greater and faster penetration.

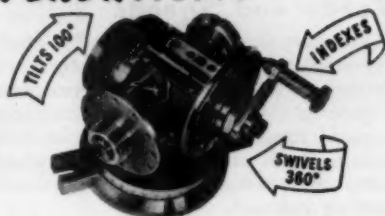
Ask for cost and production estimates based on samples of your work. Job lapping services also available.



ABRADING SYSTEMS COMPANY
8020 NORTH MONTICELLO AVENUE
SKOKIE, ILLINOIS

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JULY, 1959

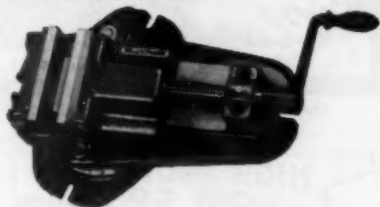
VERSATILITY



DIVIDING HEADS

6½" or 8" swing
Swivels in 2 planes
Holds work between centers,
in chucks and collets.

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5" MACHINE VISE

Plain or swivel base
Precision ground screw
V-slides with adjustable gibs
Oil hardened and ground jaws

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Save time and money with
Ellis tools. Write:

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Portable Computer Selects Feeds and Speeds

Practical feeds and speeds for starting a job are quickly obtained by direct setting of the dials on the Kennametal Cutmeter. The computer puts into convenient form the relationships of feed, speed, depth of cut, and power which have been established through metal cutting research.

Charts are provided for adjusting to




Setting of dials selects feeds and speeds.

unusual tool geometry or wear limits.
Kennametal Inc., Latrobe, Pa.

Use postpaid card. Circle No. 128

HOLES



HIGH-PRODUCTION
CLOSE TOLERANCE IN ONE PASS

Clark "HOLE MILLS"

P. O. BOX 990 BEVERLY HILLS, CALIF.

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HIGH PRODUCTION
LOW COST
PRECISION
SMALL PART MILLING



CONVERTS
TO SURFACE
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WIDE
CAPACITY

PRECISION
SPINDLE

Hand lever operation or
calibrated feed screw
Vertical mill available

Price complete as above
\$320.00
(less motor)



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NORTHERN ILLINOIS MACHINISTS
Crystal Lake, Ill. mcclurey, ill.

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THINK of it!

NOW you can have a boring head that will **BORE, FACE, TURN** and **GROOVE** at no higher cost than you would pay for an ordinary, single purpose boring head.

THINK

This over before buying that NEW head!!

A Boring Head
That Won't Face
is NOT Complete

Models for Any Size Machine
Write today for full details
CHANDLER TOOL COMPANY
MUNCIE, INDIANA



Model "D"

Chandler-Duplex

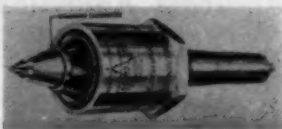
COMBINED BORING AND FACING TOOLHEADS

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MACHINE and TOOL BLUE BOOK

Live Centers Improved

Vee-Arc super-precision live centers, accurate within .000020" FIR, now incorporate a "gaging" diameter in the hardened stainless steel spindle which runs true within .000015" FIR. Inaccuracy of workpiece center holes may be determined by placing the workpiece between centers and checking this gaging diameter with a high sensitivity indicator for run-out as the workpiece is rotated slowly. Vee-Arc Corp., Westboro, Mass.



Run-out in excess of .000015" is indication of degree of workpiece center hole error.

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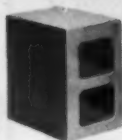
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Angle Plates



Slotted Angles



Box Parallels



Vee Blocks



Straight Edges



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Alum. Height Blocks



Boring
Mill
Parallels



Adjustable
Layout Angle Plates



Cylinder Squares



Scale Holders



Extension-Height
Blocks

All of the precision accessories shown . . . and more, too . . . are immediately available in a wide range of standard sizes or in special sizes to specifications. Complete line of layout plates, floor plates, cast iron and black granite surface plates offered, too. Send for your FREE catalog today.

MACHINE PRODUCTS Corporation

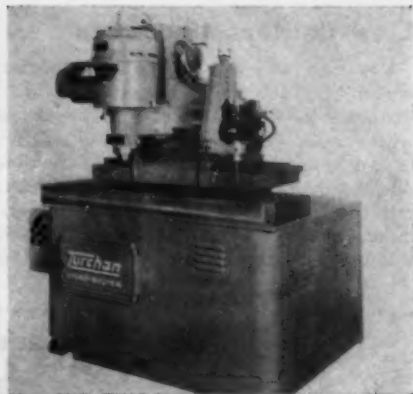
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Tracer Unit Features Accurate Adjusting

The Turchan Hydro-Router is equipped with the Turchan tracing control, a stationary table to provide for large overhanging workpieces, and a completely enclosed power unit.

The three dimension tracer valve is designed to permit easy disassembly and routine maintenance of the three directional components. The three-way micrometer adjusting assembly is con-



structed to adequately support the tracer valve.

The Turchan hydraulic power unit used has a two-chamber reservoir capacity of 60 gallons, providing for adequate filtering of the hydraulic oil.

Turchan Follower Machine Co., P.O. Box 6055, Dearborn 9, Mich.

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BY A QUICK, EASY INEXPENSIVE METHOD
Your business letterhead will bring literature

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Wilmerding, Pa.

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NAMEPLATE MARKING

Model
No. 4



The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

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- Simple Operation
- Perfect Alignment
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INFORMATIVE
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- Solid Head Rawhide Hammers
- Solid Rawhide Mallets

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70 Water St., Saco, Maine

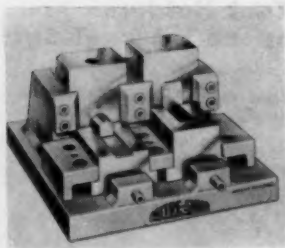
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MACHINE and TOOL BLUE BOOK

Tool Mitres Round and Square Tubing

The Mitre-Snug combines two operations in one, providing easy mitring of both round and square tubing, including preformed shapes. The unit produces close-fitting, true-mitre joints that can be brazed or induction welded without the need for filing or deburring. In most cases both the first and second cuts can be mitred in a single down-stroke of the punch press. Vogel Tool and Die Corp., 1825 N. 32nd Ave., Stone Park, Ill.

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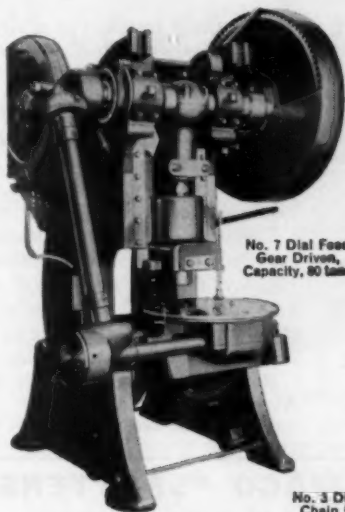
Both cuts in one press stroke

Modern FEDERAL Dial Feeds give you automation at less cost!

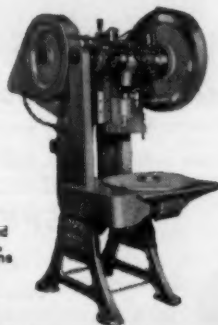
— eliminate specialized, more costly equipment!

Federal Dial Feeds are your answer to greater production at lower costs. Equipped with special jiggling, automatic feeds and ejectors, their applications are virtually unlimited and the need for specialized, more costly equipment is often eliminated. (One manufacturer increased production 600%.)

Add Federal's quality features and workmanship...and you've got a winner. Gear or chain driven with cam-type indexing mechanisms. Sizes 6 to 80 tons.



No. 7 Dial Feed
Gear Driven,
Capacity, 80 tons



No. 3 Dial Feed
Chain Driven,
Capacity, 26 tons

FEDERAL PRESS COMPANY
910 Division St., Elkhart, Indiana

FEDERAL DIAL FEED PRESSES

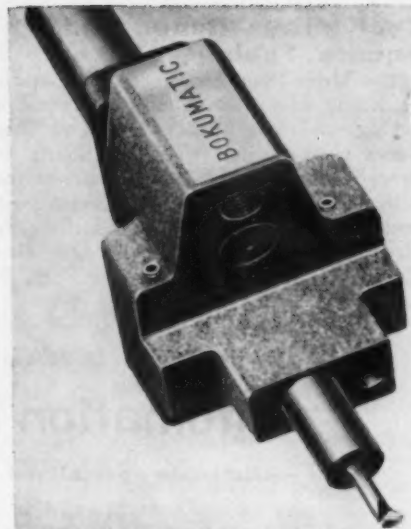
33 Years' Experience in Dial Feed Engineering and Construction

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Tool Holders Speed Internal Cutting

Metalworking operations requiring internal grooving, back chamfering, thread recessing, or special internal forming are performed easier and faster with Bokumatic RT holders for internal cutting tools. Actuation is by means of a stop rod against the spindle or spindle guard or with a draw bar.

During operation, movement consists



Dovetail side action of as much as .072 per side in smallest holder to .350 in largest.

of a horizontal, straight-line entry with a dovetail side action during cutting of as much as .072 per side in the smallest holder to .350 in the largest. Because of a preset adjustment feature, there is a minimum of waste cutting motion.

The holders are manufactured from stubby forgings, providing the necessary rigidity for accuracy and chatterless operation. They are available in six sizes for a complete range of machines, including No. 00 automatics.

Bokum Tool Co., 14755 Wildemere Ave., Detroit 38, Mich.

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NEW 5" Hinged Sine Plate features 6 1/4" x 6 1/4" WORKING SURFACE with 3 T slots

No. 1806
\$195.00 with oak case
Positive locking provides rigid set-up for light machining operations. .2000" recess in base makes small angle set-up easy. Precision ground base and body and hardened rolls insure accuracy. Heavy end and side plates. A precision tool at LOW COST.

No.	Cent. Dist.	Width	Price W/ Case
1805	5"	3"	\$109.50
1806	5"	6 1/4"	195.00
1810	10"	5"	265.00

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Choose your sine bar or sine plate from the complete Bald Eagle line starting at \$21.75
Order from your dealer or direct



Bald Eagle Corp.

(Formerly Bald Eagle Tool Company)
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SPELLMACO "SPOTTERS"

A matched set of transfer punches
for toolmakers, machinists & tool cribs

Used for transferring location of threaded, drilled
and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish

Set No. 3-17, 28 punches with indexed stand—sizes 3/32" to 1/2", by 1/64"—plus handy 17/32" size. Length 4 7/8" ONLY \$17.00
Single sizes available

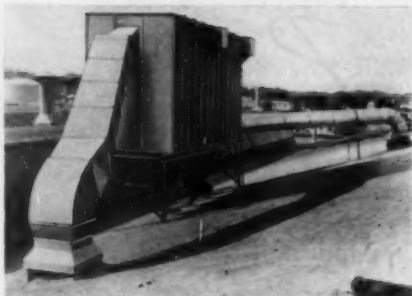
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High Volume Dust Collector

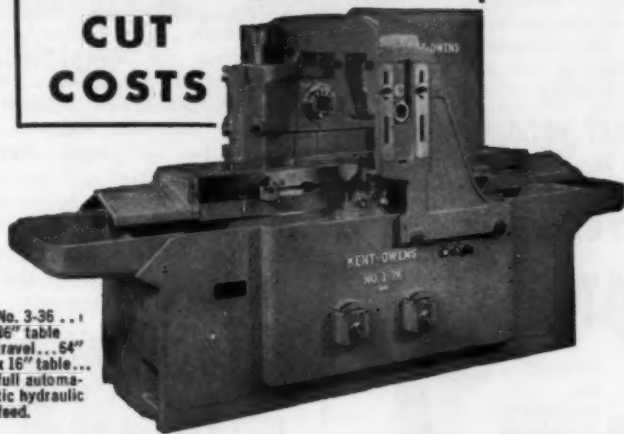
The Dustkop Filterkop, for industrial operations where the volume of air to be handled is unusually high, is used in conjunction with standard vented Dustkops. The Filterkop receives all the air collected by these units, recovers nearly 100% of the dust load, dissipates harmful fumes, and recirculates air that has been thoroughly cleaned.

Accumulated dust is automatically shaken from 80 cloth filter tubes into



Receives all air collected by Dustkops

Mill Faster
**CUT
COSTS**



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36" table
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full automa-
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feed.

Operators like 'em... because Kent-Owens Machines are extremely simple and practical. Turn out milling jobs *fast*, with minimum worker fatigue! Twin-post head mounting assures balanced load. Only two gear contacts, motor to cutter, for greater cutting efficiency. Write for bulletins on wide range of single and double spindle hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, Ohio.

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for **MILLING MACHINES**

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DIA. 9/0 to #4

As specialists in stainless-steel, instrument-type pins, we offer quantity runs of standard size Taper Pins. Tolerances are held to .001 on dia. Sizes run from #4 down to 9/0. Send your blueprints for prompt quotation.

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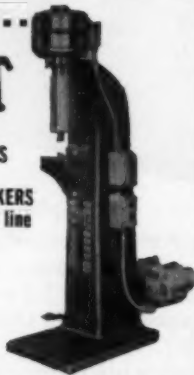
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RIVETERS..



PIONEERS
and
PACEMAKERS
in their line



—head rivets from smallest to 3/4" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Vertical and Horizontal Multiple Spindle.

Write for literature and don't forget to send samples

THE GRANT MFG. & MACHINE CO.
CE Station Bridgeport 5, Conn.

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a hopper at the end of each fan operation. One shaker serves two Filter-kop units, and no matter how large the installation, only one air inlet and one air outlet are needed.

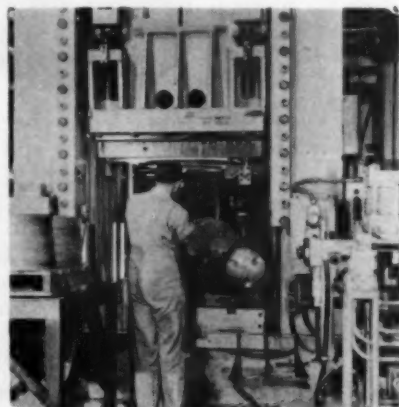
Aget Mfg. Co., Adrian, Mich.

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Deep-Draw Feature Speeds Press Operations

Steel shells for air-conditioning compressor units are stamped in a single draw from 22 3/4" diameter blanks at a rate of 100 in a 64-minute period with a 400 ton Steelweld Speed-Draw press. The finished shells are 11.35" diameter and 11" deep. The material is 0.1644" draw-type steel. All dimensions are held accurately to specifications, and the stampings are smooth and uniform.

The shells are made in two different lengths, which are welded together to form a complete compressor housing. The upper, or longer, shell is drawn through die rings and ejected from the dies onto a conveyor below the machine. This draw is greater than a 50% reduction from blank size. The lower, shorter shell is removed from the draw and form die by the operator and placed



Operator removes shell from die, places it on side punch, inserts next shell blank.

onto a tool at the right front of the press which punches a hole in the side at the same time the next shell is being formed.

The deep-draw feature of the Steel-weld Speed-Draw frequently reduces the number of operations required to form a part and often permits operations that are not usually possible on a press.

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Lift Truck Redesigned

The Barrett Model TTG tilting-type fork Hi-lift truck has been redesigned and improved for high stacking of pallet and skidloads of materials. It comes in capacities from 1000 to 3000 lb., with varied fork lengths and widths to handle any size load. For each capacity, two standard models are offered: one

He knows to a fractional "tenth"
the exact hole size

To make precision holes he
needs a precision gage

COMTORPLUG Expanding Internal Gage
for holes $\frac{1}{8}$ " to 10" dia.

With EXACT GAGING KNOWLEDGE, you can

- eliminate rejects
- improve quality
- increase production



With COMTORPLUG, the operator not only knows hole diameter, but also detects front or back taper, ovality, barrel shape, etc. A fixed—not passing—reading. Automatic features assure uniform gaging free of operator influence. No air hose, no wires, no electronic gear.

REASONABLE IN COST



For holes
 $\frac{1}{8}$ " to 10" diameter

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Century Electric Co.	General Electric Co.	Northrup Aircraft
Chicago Pneum. Tool	Hamilton Standard Division	Pontiac Motor Div.
Chrysler Corp.	Harris Seybold Co.	Scintilla Magneta
Continental Motors	Homelite Corp.	Steel Products Eng.
Curtiss-Wright	Int. Harvester Co.	Studebaker-Packard
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COMTORPLUG



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HEIMANN TRANSFER SCREW SETS

IN 11 SIZES—No. 6 to 1"
N.C. in all S.A.E. sizes.



Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

HEIMANN MFG. CO. • URBANA, OHIO

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with lowered height of 68 inches and full fork lift of 106 inches; one with lowered height of 83 inches and full

fork lift of 136 inches. Other mast lift specifications are available. Free lift of the forks (before the telescopic mast rises) varies with the model, but can be as much as 65 inches.

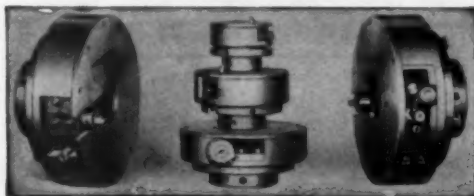
The truck has a new gear drive. The entire unit is held to the chassis with only four bolts, making rapid dismantling possible.

The hydraulic lift and tilt mechanism, with hose connections, oil reservoir, and heavy-duty lift motor and pump are placed directly behind the mast. A single hydraulic tilt cylinder gives full mast tilt of 3 degrees forward, 12 degrees back.

The truck has two speeds forward, two speeds reverse. Dual lifting, lowering and mast tilting control handles are placed at a convenient height within arm's reach.

Barrett-Cravens Co., 628 Dundee Rd., Northbrook, Ill.

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MUMMERT-DIXON FACING HEADS with Automatic Feed

One-way Tool Feed—8, 9 and 12" sizes.

Two-way Tool Feed—8, 12, 16, 20, 24, 30, 36, 40 and 46" sizes. Save many costly set-ups.

Bulletin No. 4141 Gives Full Details

MUMMERT-DIXON CO. 122 Philadelphia St., Hanover, Pa.

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Machine Installs Ring on Stud-and-Disc Assembly

This automatic assembly machine for Truarc Series 5100 external-type retaining rings is used for high-speed, mass-production installation of rings on the control knob stud-and-disc assembly shown in the inset drawing.

The unit has a vibratory hopper which feeds the rings in single file onto an inclined chute. The rings slide down the chute—also in single file—to a stop

connected to an escapement which releases one ring at a time. When a ring is released by the escapement, it slides down the remaining portion of the chute and drops onto a free-floating tapered mandrel which is held by two mechanical fingers. The diameter of the bottom of the mandrel is slightly larger than the diameter of the shaft on which the ring is to be assembled.

The base of the machine under the mandrel is equipped with a nest which

Handy as a THIRD HAND!



Model CF-50 furnished with 3-way sleeve valve as shown (less collet).



AIR-OPERATED

Collet Holding Fixtures



USE YOUR OWN COLLETS...
Model CF-50 takes #1A or #3C,
Model CF-100 takes #5C, Model
CF-138 takes #2J standard collets.
Collets easily changed from top
without disturbing chuck.

EXTRA PORT for coolant, air
ejection of work piece, chip blowing,
etc.

LOW COST! Model CF-50 with 3-way sleeve valve \$65.00
Models CF-100, CF-138, without valve* 99.50

*Modernair can furnish any type of
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desired.

WRITE TODAY FOR LITERATURE,
SPECIFICATIONS . . . Please address
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**SPEEDY-SAFE
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Indispensable for Tool
Rooms, Machine Shops,
Schools, etc. Now avail-
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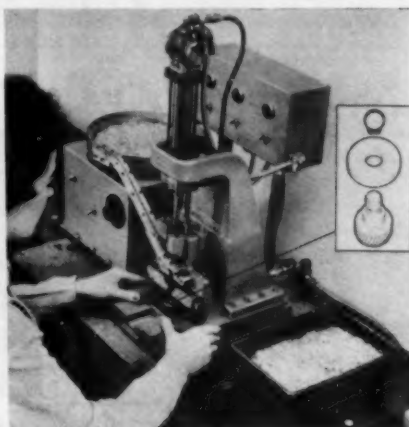
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Thread Grinding facilities as well as
modern Cam Milling and Cam Grind-
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23-22 45th Road Long Island City 1, N. Y.

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Vibratory hopper feeds rings in single file.

holds the workpiece on which the re-
taining ring is to be mounted. To ac-
tuate the machine, the operator merely
places the workpiece in the nest and
pushes the nest forward. A sleeve op-
erated by an air cylinder fits closely over

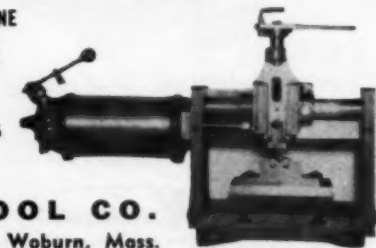
AIR OPERATED HJORTH PRODUCTION MARKING MACHINE

MARKS ANYTHING

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- Air equipped production model only \$375

Write for illustrated Bulletin

HJORTH LATHE & TOOL CO.
8-12 Beacon St.



Woburn, Mass.

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the mandrel and when the machine is actuated pushes down the retaining ring which previously had dropped onto the mandrel. As the ring is pushed over the wider portion of the mandrel, it is spread open sufficiently so that it passes over the stud end of the workpiece and snaps into an accurately located groove precut in the stud.

Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N.Y.

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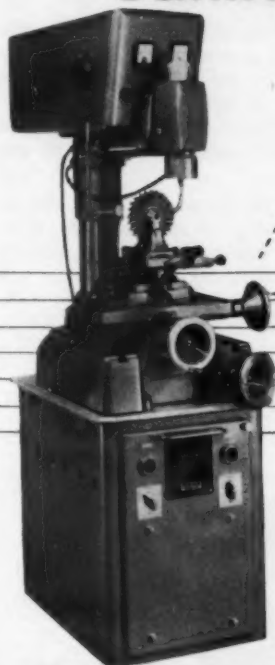
Tap Extensions for Inaccessible Locations

Style B tap extensions (or tap holders), designed specifically for machine tapping operations, are now available for standard taps in sizes ranging from No. 0-80 to $\frac{1}{2}$ "-20. They are equally suitable for hand tapping work, make possible either machine or hand tapping of otherwise inaccessible holes.

The squared shank of the tap fits

Like to increase your cutting tool life up to

400% ?



Examples of increased tool life

Turning Tool, Single Point	250%
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Slitting Saw, 60 Teeth	400%
Punch and Die	300%
Reamer, 6 Flutes	50%
End Mill, 2 Flutes	75%

Ask for 12 page bulletin "Sparcard"

Hardness and wear resistance of tungsten carbide are combined with toughness and resilience of high speed steel.

New Sparcard machine deposits and bonds carbide on tool surface by electrical discharge.

EASCO PRODUCTS

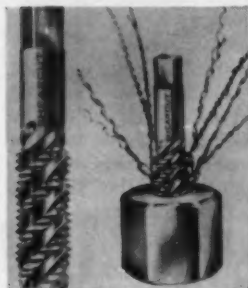
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YPSILANTI, MICH.

CANADIAN REP. B.S.A. TOOLS LTD., TORONTO

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SUPER-SPEED THREAD BROACHES

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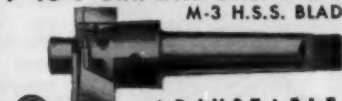
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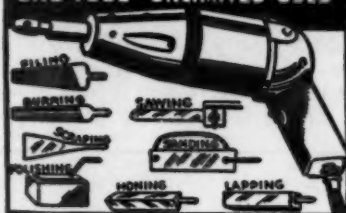
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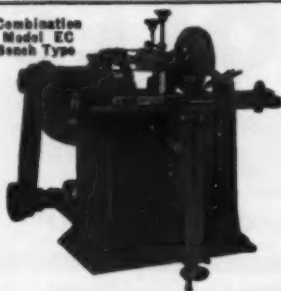
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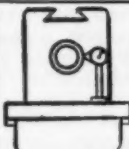
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Washington News. The Revenue Service will check depreciation deductions for machines working overtime; the Labor Dept. reports decreases in both hirings and layoffs in manufacturing during April; the outgoing FTC chairman tells how to stop inflation.

Creative Engineering in Production of Automobiles. Wm. F. Schleicher describes a few of the highly mechanized operations at General Motors' Opel Works in Ruesselsheim, West Germany. These include the turning, drilling and boring of brake drums on a pallet type transfer machine, the automatic valve line, the broaching and drilling of the shifting rods, the propellor shaft fork and yoke line, the cylinder block line and the grinding of universal cross joints.

Individual vs Group Incentives. The choice of an incentive plan depends on a number of factors and H. R. Nissley presents five questions to guide you in your choice.

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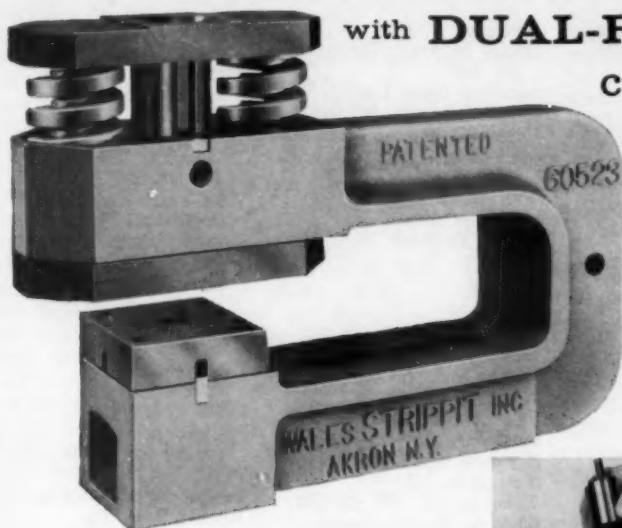
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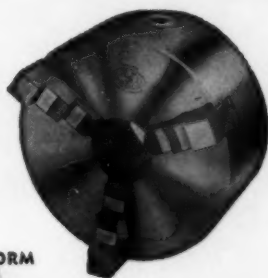
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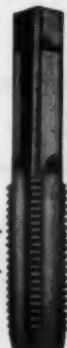
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SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
00	86	15/32	32	1-3/4	5-8-10-12-14-16-18-20-24
0	70-72-76-80	1/2	12-13-14-16-18-20-24-27-28-32-36-40	1-13/16	16-18-20-24-32
1	48-56-64-72-80-88	9/16	12-14-16-18-20-24-27-28-32-36-40	1-7/8	8-10-12-14-16-18-20-24
2	48-52-56-60-64-72-80	5/8	10-11-12-14-16-18-20-24-27-28-32-36-40	1-15/16	5-8-10-12-14-16-18-20-24
3	48-54-58-62-66-70-74-78-80	11/16	10-11-12-14-16-18-20-24-27-28-32-40	4-1/2	14-16-18-20
4	30-32-36-40-44-48-50-54-58-60-64-66-68-70-72-74-76-78-80	3/4	10-11-12-14-16-18-20-24-27-28-32-36-40	2-1/16	8-10-12-14-16-18-20
5	30-32-36-40-44-48-50-54-58-60-64-66-68-70-72-74-76-78-80	13/16	10-12-14-16-18-20-24-27-28-32-40	2-1/8	12-14-16
6	30-32-36-40-44-48-50-54-58-60-64-66-68-70-72-74-76-78-80	7/8	8-10-12-14-16-18-20-24-27-28-32-40	2-3/16	10-12-14-16
7	24-30-36-40-44-48-50-54-58-60-64-66-68-70-72-74-76-78-80	15/16	8-10-12-14-16-18-20-24-27-28-32-40	2-1/4	4 1/2-8-10-12-14-16-18
8	24-30-36-40-44-48-50-54-58-60-64-66-68-70-72-74-76-78-80	1	8-10-12-14-16-18-20-24-27-28-32-40	2-5/16	12-14-16-18
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3/32	38-48	1-5/16	6-8-10-12-14-16-18-20-24-27-32-36	2-3/4	4-8-10-12-14-16
1/8	32-36-40-44-48	1-7/16	8-10-12-14-16-18-20-24-27-32-36	2-7/8	8-10-12-14-16
5/32	32-36-40-44-48	1-1/2	8-10-12-14-16-18-20-24-27-32-36	3	4-8-10-12-14-16
3/16	20-24-28-32-36-40-48	1-5/8	6-8-10-12-14-16-18-20-24-27-32-36	3 1/2	8-10-12-14-16
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SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
0	80	3/8	16-24-32	1-3/8	8-10-12-14-16-18-20-24
1	36-64-72	7/16	14-20-28	1-7/16	8-10-12-14-16-18-20
2	36-64	1/2	12-13-20-28	1-1/2	6-8-10-12-16-18-20
3	36	9/16	12-18-20-24	1-9/16	8-10-12-16-18-20
4	32-36-40-48	5/8	11-12-18-20-24	1-5/8	8-10-12-14-16-18-20
5	40-44	11/16	11-16-24	1-11/16	8-10-12-14-16-18-20
6	32-36-40	3/4	10-16-18-20	1-3/4	8-10-12-14-16-18-20
7	32-36-40	13/16	16	1-13/16	8-10-12-14-16-18-20
8	24-30-32-40	7/8	9-12-14-18-20	1-7/8	8-10-12-14-16-18-20
10	24-28-32	1	8-12-14-16-18-20	1-15/16	8-10-12-14-16-18-20
12	20-28-32	1-1/8	7-12	2	4 1/2-10-12
1/4	16-20-24-28-32	1-1/4	7-12-16-18		
5/16					

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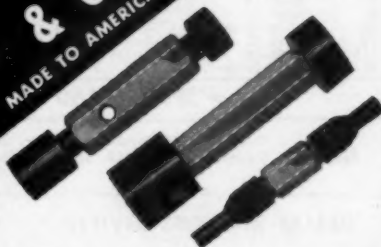
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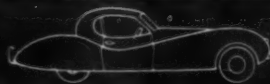
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